Course Name: M. Sc. in Computer Science (Conversion)

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Module Code: COMP41500

Lecturer: Mr. Tom Brett

Assignment Details: Create a User Manual outlining the steps involved in a number of pre-defined tasks

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Abstract: The purpose of this user manual is to outline and explain the reasons for taking particular steps when completing given tasks while also guiding the user through the main steps by the use of modified screenshots and written procedures

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Table of Contents

Table of Contents....2
Overview....4
Task A.9 - Introduction to Virtualisation....5
Virtualisation Benefits....5
Virtualisation Disadvantages....6
Task A.1 - Connecting to and Installing vSphere Client....9
Task Overview....9
Technical Issues....9
Task Guide....11
1. Install *ESXi* host....11
2. Install *vSphere Client.* Then connect to and access the *ESXi* Host....18
Task A.2 - Creating Virtual Machines using VMware ESXi and vSphere Client....24
Task Overview....24
The Differences between vCenter Server and vCenter Server Appliance....24
Technical Issues....26
Task Guide....29
1. Upload both Operating System ISO image files as well as the *vCenter Server* ISO image file to the *Datastore*....29
2. Create a New Virtual Machine....32
3. Install *Windows Server 2008 R2* Operating System....36
4. Change the ISO to *vCenter Server*....41
5. Install *vCenter Single Sign-On*....43
6. Install *vSphere Web Client*....48
7. Install *vCenter Inventory Service*....52
8. Install *vCenter Server*....57
9. Install *vSphere Client* on this *Windows Server 2008 R2* machine....64
10. Start all VMware services from the *Task Manager*....64
11. Login to *vCenter Server*....65
12. Install *Microsoft Windows 7* Operating System....66
Task A.3 - Creating a Typical Organisation Environment....71
Task Overview....71
Task Guide....71
1. Create Folders for the various locations where the organisation is based....71
2. Add Datacenters to the appropriate location folder....72
3. Add the appropriate Hosts to the Datacenters....73
4. Create virtual machines within these Hosts....75
5. Organise as appropriate....78
Task A.4 - Creating, Managing and Reverting to a Snapshot....79
Task Overview....79
Snapshot Example....79
Task Guide....79
1. Create snapshot of running Virtual Machine....79
2. Create snapshot of Virtual Machine that is not running....81
3. Open the *Virtual Machine Snapshot Manager*....82
4. Delete a snapshot....83
5. Revert to a snapshot....84
Task A.5 - Creating a Gold Image (Template)....86
Task Overview....86

Technical Issues....86
Task Guide....86
1. Update Operating System and Applications appropriately....86
2. Convert or Clone the virtual machine to a template....89
Task A.6 - Deploying a Virtual Machine using a Gold Image....91
Task Overview....91
Task Guide....91
1. Create a Customization Specification using the Customization Specification Manager....91
2. Deploy a Virtual Machine from a Template....94
3. Turn on the virtual machine....97
Task A.7 - Converting a Physical Computer to a Virtual Computer....100
Task Overview....100
Technical Issues....100
Task Guide....100
1. Install *VMware vCenter Converter*....100
2. Virtualise the appropriate virtual machine....102
Task A.8 - Installing Debian Linux....107
Task Overview....107
Technical Issues....107
Task Guide....108
1. Create a New Virtual Machine....108
2. Install *Linux Debian*....111
Endnotes....125

Overview

The purpose of this assignment is to provide a thorough understanding of virtualisation environments; how to set them up and how to manage them by increasing the reader's practical knowledge and skills in relation to both. In order to do this, I will create a virtual environment using *VMware vSphere*, a leading enterprise virtualisation software suite. Within this environment, a number of Virtual Machines (VMs) will be created and pre-defined tasks will be explained, completed and a guide through provided, as outlined in the Table of Contents on pages two and three.

I have created this user's manual which documents in detail all of the steps necessary to complete each task. It also outlines the benefits of taking these steps and when they may be justified. All screenshots have been cropped and compressed in order to reduce file sizes, as well as to highlight specific areas. Certain sections of the screenshots have been highlighted in order to pinpoint specific areas of significance.

Explanations of the purpose and relevance of each task are provided in the first few paragraphs. All technical issues in relation to software and hardware requirements are also addressed. References are then provided to facilitate sourcing further information in relation to the task if required. Instructions as regards how to implement the task are then provided. For clarity, easy to follow numbered steps are outlined, along with the appropriate screenshots.

The following naming convention is used. Specific styles are used for each naming convention in order to make it simple to make modifications throughout the report:

- Buttons that have to be pressed/clicked are in *this italic Cambria* style (named Steps).
- Names of software/programs are in *this italic Times New Roman* style (named Software).
- If you have to type something, it is surrounded in `'inverted commas and also uses the Courier New'` style (named Commands).

If you do not like one of these styles or would like to highlight a particular style, any of the styles can be modified by changing the style within *Microsoft Word's Styles* section.

Task A.9 - Introduction to Virtualisation

The following section will first give an overview and definition of what virtualisation is. Following on from this, the benefits and disadvantages of virtualisation will be discussed. The final paragraph will give an overview of the section and will draw conclusions based on the previous paragraphs.

Traditionally, there has been one Operating System (OS) with multiple applications on each physical machine. The physical machine must be powerful enough to run this OS and its applications at their peak workload. Even if this peak only happens for one hour per day, this hardware is still required. A consequence of this is that for twenty three hours, the hardware is underutilised.

This is where virtualisation comes into play. Virtualisation allows an organisation to run multiple operating systems and applications on one physical machine. This helps use the physical machines to their full potential. Kusnetzky (2007) gives a detailed overview of what virtualisation is: 'Virtualization is a way to abstract applications and their underlying components away from the hardware supporting them and present a logical view of these resources. This logical view may be strikingly different than the physical view. The goal usually is one of the following: higher levels of performance, scalability, reliability/availability, agility or to create a unified security and management domain.'[1]

Virtualisation Benefits

Performance and Hardware Utilisation: As mentioned above, if computers are used for just one purpose and are fully active for only specific periods of time, they are going to be underutilised. Virtualisation technology allows you to manage how your hardware is used so it can be used more effectively. Multiple 'Virtual Machines' can all use the same underlying hardware. Hence, if setup properly, the full potential of the hardware can be used all of the time (and also cater for redundancy). Limits, reservations and shares can be used to ensure that specific machines always have specific amounts of hardware available to them, and limit the amount of hardware that they can use. This enables an administrator to ensure that 'critical machines' always have enough hardware available to them.

Cost: Although there are costs associated with implementing a virtualised environment, there can be long term financial benefits. These long term benefits will be discussed here. If the number of required servers is reduced, there are resulting savings in terms of both energy and space. As less power is consumed due to the decrease in computers and cooling systems required, energy costs are reduced. As well as this, the saved space can be used for other purposes if necessary. Because fewer computers are in use, there is also less maintenance required. There are consequent savings in relation to both labour and hardware. As well as this, maintenance can often be completed without incurring any downtime, meaning fewer interruptions for both staff and customers.

Testing Environments: Virtual Machines can be used as testing environments by developers and software testers. They are ideal environments, as features such as *snapshots*, and *vApps* enable developers to create environments to which they can revert if necessary (i.e. if they damage the environments). They can also *clone* environments if they need to use the same environment for multiple purposes. This can save on time as installations do not have to be

completed multiple times. There is also no risk of damaging the underlying hardware as the software is abstracted from the hardware. Repair of damage could prove costly if physical machines were being used for testing purposes.

Scalability: Virtualised environments can be configured to scale automatically. For example, with *VMware's vSphere*, 'if all virtual machines on a host spike at the same time and require all of their memory allocation, *VMware DRS* can automatically load balance by performing *vMotion* live migrations of virtual machines to other hosts in the *DRS* cluster.'[2] This means that, if configured appropriately, if there are adequate resources available to run the VMs, there should not be any significant performance related issues.

As well as this, a number of memory management features are available in *VMware's vSphere*. These comprise of transparent page sharing, guest ballooning, hypervisor swapping and memory compression. These features come into play when you over-allocate hardware, and they can be used for getting the most of your hardware (although this would not be recommended). 'By more intelligently managing virtual machine memory use, VMware lets you maximize the number of virtual machines your hardware can support.'[3]

Management, Reliability and Agility: Features such as *Distributed Resource Scheduling, High Availability* and *Fault Tolerance* allow administrators to ensure that the hardware requirements of virtual machines are automatically distributed evenly between computers, and that there is guaranteed uptime if there are problems with a server. These features do, however, require at least two servers. Other features such as *vMotion* allow administrators to remotely move virtual machines from server to server, by simply using *vCenter Server*.

As well as this, as mentioned above, *Cloning* can be used to provision servers very quickly on demand. You can create *Templates* that act as 'Gold Images' of specific environments. This enables an administrator to efficiently deliver ready-to-go environments by cloning the template. You can also use *Linked Clones* to minimise hardware requirements if necessary. 'A linked clone is a duplicate of a virtual machine that uses the same base disk as the original, with a chain of delta disks to track the differences between the original and the clone.'[4] This can be very useful for saving disk space.

Virtualisation Disadvantages

Security: One of the main disadvantages of virtualisation is Security. CIO defines the top five security concerns relating to server virtualisation[5]. These concerns include: Managing oversight and responsibility, patching and maintenance, visibility and compliance, VM sprawl and managing Virtual Appliances. I have identified various issues below:

Because VMs are stored as files, they can simply be copied onto a USB. This is a disadvantage from a security standpoint as VMs can quickly be copied. This compares to physical machines where it would take longer to be copy a machine and require additional software. This in itself can be a risk. Also, if a template is misconfigured, any clone of this template is also misconfigured leading to significant security vulnerabilities, especially if this template is cloned multiple times. Ensuring templates are actually 'Gold Images' is essential.

If IT staff do not fully understand virtualisation, they can unwittingly leave security vulnerabilities exposed. Virtualisation requires new skills and a new understanding as it combines the understanding of physical hardware and software with the understanding of

virtualisation hardware and software. As a result, a virtualised environment is more complex. A clear understanding of how virtualisation works is essential if security is to be catered for.

Hardware Requirements: This section relates to the section above. *VMware* offer support only for specific tried and tested hardware. If purchased hardware is not in line with *VMware's* recommendations, they may not support it. Hence, it is essential that the appropriate compatible hardware is used. *Microsoft* and *Citrix* offer a more lenient approach to hardware requirements due to their underlying architectures.[6]

As well as this, some hardware does not support virtualisation. This mainly relates to processors and chipsets. *Intel Virtualisation (VT-x)* and *AMD Virtualisation (AMD-V)* are both examples of processors that support virtualisation.

Finally, virtualisation itself requires certain resources in order to abstract hardware from software. Management of this environment also requires resources. For example, *VMware ESXi* requires resources which vary depending on its usage. In order to take full advantage of *ESXi* features and run virtual machines in typical production environments, at least 8GB of RAM is recommended.[7] On top of this you have to cater for *vCenter Server* and *vSphere Client*.[8]

Cost: This section has been included in both the advantages and disadvantages of virtualisation. This is because virtualisation implementation incurs costs as well as generating savings. Firstly, virtualisation requires additional software to be used. There are various vendors, but the main enterprise players are *VMware vSphere*, *Microsoft Hyper-V* and *Citrix XenServer*. They come at varying costs and their features differ.

Secondly, there may be a learning curve for existing IT staff. As new software is being used, and a new concept must be learned, staff may need training. This is costly as staff need to be paid while undergoing training, despite the fact that they are not available to do any work in-house and on top of this, the individuals providing the training need to be paid.

Thirdly, it may also be necessary to incur costs related to purchase of new hardware. As mentioned above, certain virtualisation-supported hardware may be required in order to make use of virtualisation. It should be noted that most modern day hardware supports virtualisation but it is an important factor to consider if you are planning to implement virtualised environments using older systems.

Mismanagement: Although virtualised environments can be very beneficial for administrators, if they are mismanaged, the consequences can be serious. In comparison to before where one or two servers may go down due to mismanagement, the potential is that the whole environment goes down. Hence, it is essential to ensure that not only is the virtualised environment configured properly, but that disaster recovery plans are in place, and that they are tested to ensure that they work effectively. This is essential to ensure that there is no significant downtime.

In conclusion, based on the above arguments, I think it is easy to recognise that virtualisation can significantly improve efficient and effective use of hardware within an organisation. In many cases, this makes administration easier and lowers the administration costs. However, virtualisation does have some disadvantages. It can cost quite a lot of money to implement initially and security becomes more complex. All factors involved with virtualisation must be

taken into account and catered for. It is without doubt an exciting new technology that has changed the look of datacentres throughout the world. Finally, I will leave you with the following quote: ‘Over the last 30 years, virtualization technology has been developed to enhance how individuals access computing solutions, how applications are developed and deployed, how they are processed, where and how they are stored, how systems communicate with one another, and, of course, how an extended system environment can be made both secure and manageable. This broad view is very important if an organization hopes to make optimal use of this technology.’[9]

Task A.1 - Connecting to and Installing vSphere Client

Task Overview

In order to connect to and install a *vSphere Client*, the first thing you have to do is install the *ESXi* host. This installs very like any Operating System. You install it on the physical machine by inserting a CD or connecting a USB and booting from the appropriate location. *ESXi* can come pre-installed (like *Windows 7* on a laptop) in some cases whereby the hardware is certified by *VMware* (known as *ESXi* Embedded). However, for the purposes of this assignment, we will be using the installable version which is used when *ESXi* is not pre-installed. What does *ESXi* actually do? '*VMware ESXi* is an operating system-independent hypervisor based on the *VMkernel* operating system interfacing with agents that run atop it. *ESXi* is the exclusive hypervisor for *VMware vSphere* 5.x licenses.'[10] It is essentially contains the software that allows you to abstract the hardware from the software.

However, in order to connect to the *ESXi* host, you must install further software. This is where *vSphere Client* comes into play. *vSphere Client* allows you to connect to the *ESXi* host in order to create and manage virtual machines on that *ESXi* host. There are two *vSphere Client* versions; *vSphere Client* and *vSphere Web Client*. *vSphere Client* can be installed on an Operating System, while *vSphere Web Client* can be used from any web browser. In this case, *vSphere Client* will be installed on an Operating System.

For further information relating to the task outlined, please see Scott Lowe's Mastering VMware vSphere 5, Chapter 2.[11]

Technical Issues

As discussed in the introduction to virtualisation section, *ESXi* has certain hardware and software requirements. One hardware requirement is that the processor within the *ESXi* host supports virtualisation. There are then system requirements that are necessary for *ESXi* 5.1 to work. These system requirements are taken directly from *VMware's* website[12] and relate to *ESXi* 5.1:

Supported server platform

For a list of supported platforms, see the VMware Compatibility Guide.

64-bit Processor

- ESXi 5.1 will install and run only on servers with 64-bit x86 CPUs.
- ESXi 5.1 requires a host machine with at least two cores.
- ESXi 5.1 supports only LAHF and SAHF CPU instructions.
- ESXi 5.1 requires the NX/XD bit to be enabled for the CPU in the BIOS.
- ESXi 5.1 supports a broad range of x64 multicore processors. For a complete list of supported processors, see the VMware Compatibility Guide.

RAM

- 2GB RAM minimum

- Provide at least 8GB of RAM to take full advantage of ESXi 5.1 features and run virtual machines in typical production environments.

Hardware Virtualization Support

- To support 64-bit virtual machines, support for hardware virtualization (Intel VT-x or AMD RVI) must be enabled on x64 CPUs.
- To determine whether your server has 64-bit VMware support, download the CPU Identification Utility from vmware.com.

Network Adapters

- One or more Gigabit or 10Gb Ethernet controllers. For a list of supported network adapter models, see the VMware Compatibility Guide.

SCSI Adapter, Fibre Channel Adapter or Internal RAID Controller

Any combination of one or more of the following controllers:

- Basic SCSI controllers. Adaptec Ultra-160 or Ultra-320, LSI Logic Fusion-MPT, or most NCR/Symbios SCSI.
- RAID controllers. Dell PERC (Adaptec RAID or LSI MegaRAID), HP Smart Array RAID, or IBM (Adaptec) ServeRAID controllers.

Installation and Storage

- SCSI disk or a local, non-network, RAID LUN with unpartitioned space for the virtual machines.
- For Serial ATA (SATA), a disk connected through supported SAS controllers or supported on-board SATA controllers. SATA disks will be considered remote, not local. These disks will not be used as a scratch partition by default because they are seen as remote. Note: You cannot connect a SATA CD-ROM device to a virtual machine on an ESXi 5.1 host. To use the SATA CD-ROM device, you must use IDE emulation mode.
- Supported storage system: ESXi 5.1 supports installing on and booting from these storage systems:
    - SATA disk drives. SATA disk drives connected behind supported SAS controllers or supported on-board SATA controllers.
        - LSI1068E (LSISAS3442E)
        - LSI1068 (SAS 5)
        - IBM ServeRAID 8K SAS controller
        - Smart Array P400/256 controller
        - Dell PERC 5.0.1 controller
    - SATA disk drives. Supported on-board SATA include:
        - Intel ICH9
        - NVIDIA MCP55
        - ServerWorks HT1000

Note: ESXi does not support using local, internal SATA drives on the host server to create VMFS datastores that are shared across multiple ESXi hosts.

- Serial Attached SCSI (SAS) disk drives supported for installing ESXi 5.1 and for storing virtual machines on VMFS partitions.
- Dedicated SAN disk on Fibre Channel or iSCSI
- For a list of USB devices supported for installing ESXi 5.1, see the VMware Compatibility Guide.
- You can install and boot ESXi from an FCoE LUN using VMware software FCoE adapters and network adapters with FCoE offload capabilities. See the vSphere Storage documentation for information about installing and booting ESXi with software FCoE.

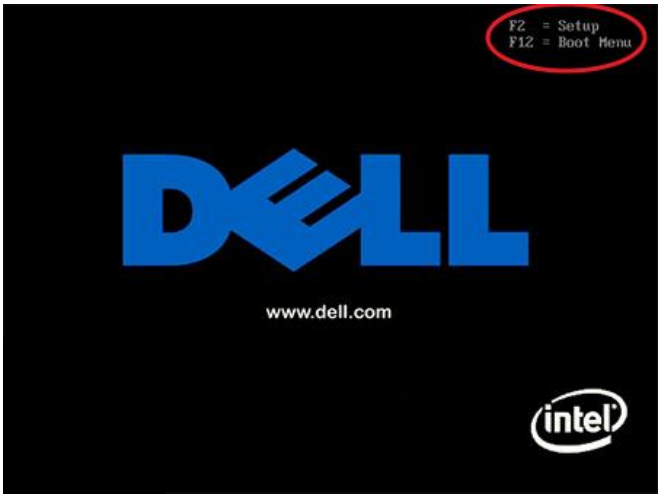
vSphere Client also has some software requirements. The main recommendation is that *Microsoft .Net* is installed (if installing on a *Microsoft* Operating System). 'The *vSphere Client* requires *Microsoft .Net* to be installed and updated so if this is not already done it can take some time to perform.'[13] *VMware's* Compatibility Guide can be used to find the most up to date information in relation to supported Operating Systems.[14] Please note that *vSphere Web Client* requires *Adobe Flash* in order to work.

Task Guide

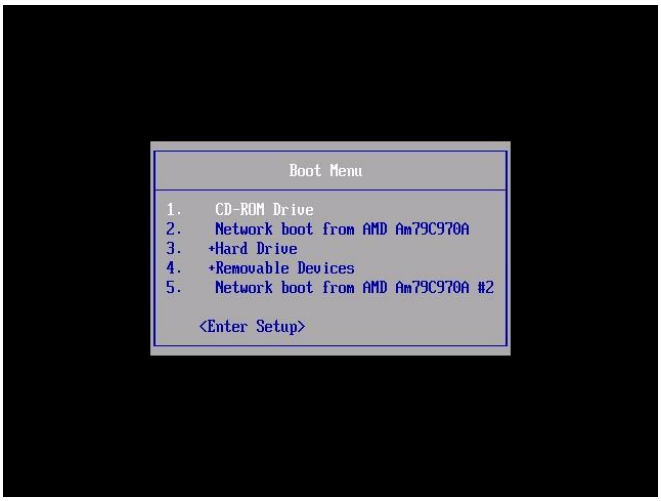
1. **Install *ESXi* host**

    a. Insert CD of *VMware ESXi* into CD Drive. You may also install this by means of a USB Drive

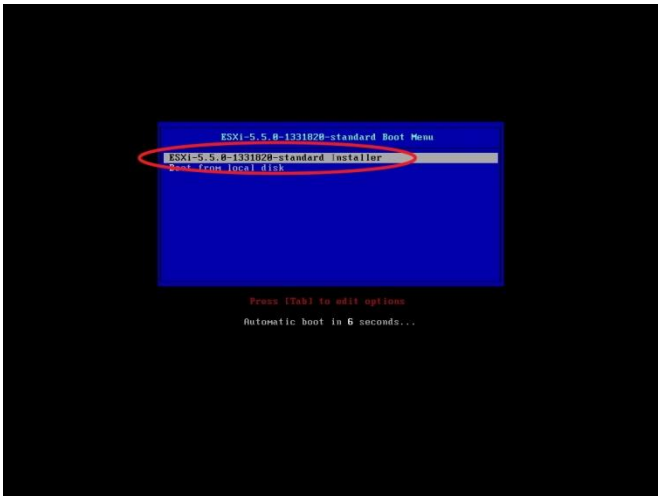
    b. Boot from CD/USB by pressing *F12* when you power on the machine (this may vary depending on vendor)



c. Select the preferred drive to boot from and press *Enter*

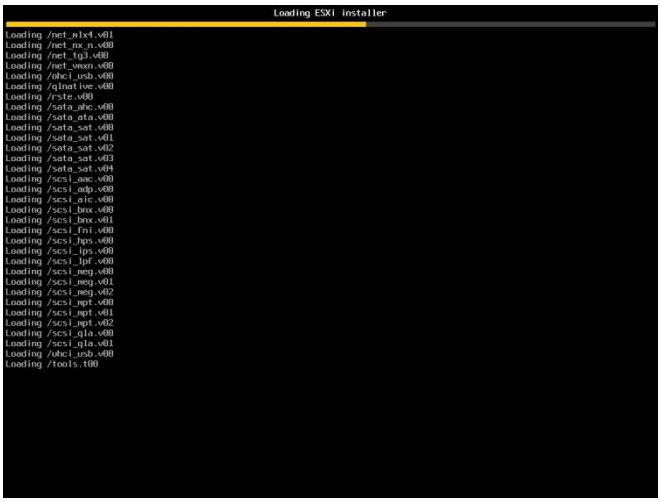

Boot Menu
1. CD-ROM Drive
2. Network boot from AMD Am79C970A
3. +Hard Drive
4. +Removable Devices
5. Network boot from AMD Am79C970A #2
<Enter Setup>

d. Select *ESXi-5.5.0-*******-standard installer* and press *Enter*



e. You can press *Enter* to boot quicker

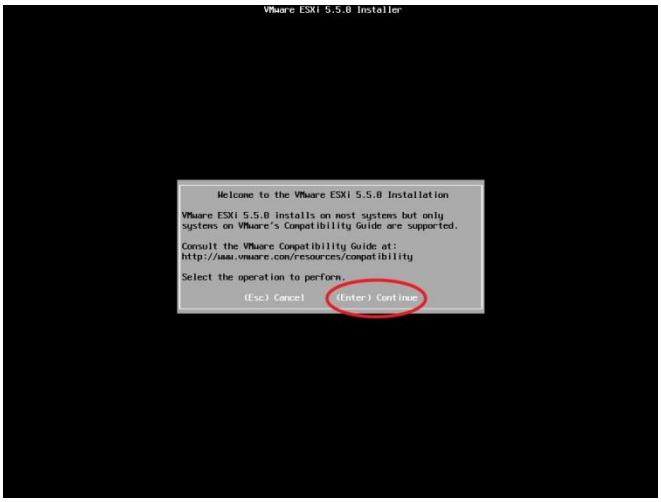
f. The *ESXi* Installation begins



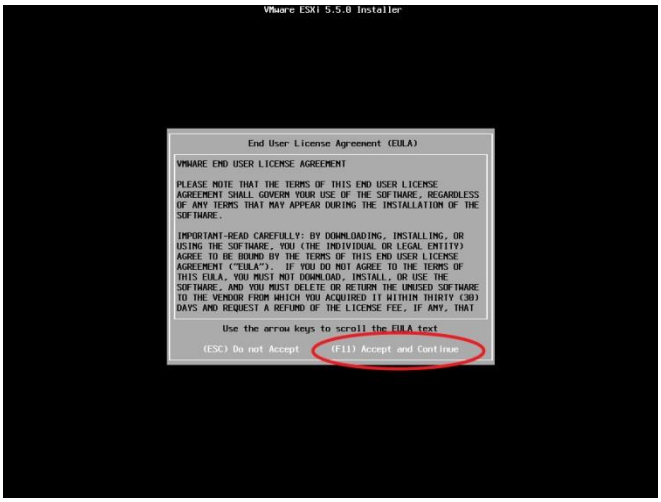
g. *ESXi* automatically goes through a number of screens. This may take some time

VMware ESXi 5.5.0 (VMkernel Release Build 1331820)
VMware, Inc. VMware Virtual Platform
2 x Intel(R) Core(TM) i7-2670QM CPU @ 2.20GHz
4 GiB Memory
swapobj loaded successfully.

h. An installation wizard appears. Press *Enter* to continue

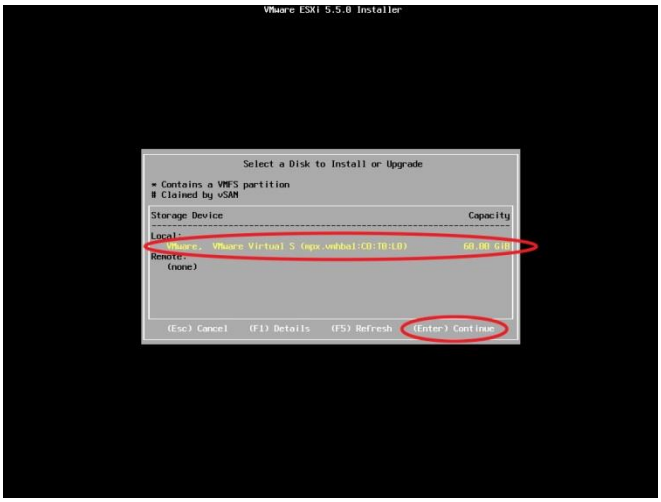

VMware ESXi 5.5.0 Installer
Welcome to the VMware ESXi 5.5.0 Installation
VMware ESXi 5.5.0 installs on most systems but only systems on VMware's Compatibility Guide are supported.
Consult the VMware Compatibility Guide at:
http://www.vmware.com/resources/compatibility
Select the operation to perform.
(Esc) Cancel
(Enter) Continue

i. Press *F11* to accept the *End User Licence Agreement (EULA)* and continue

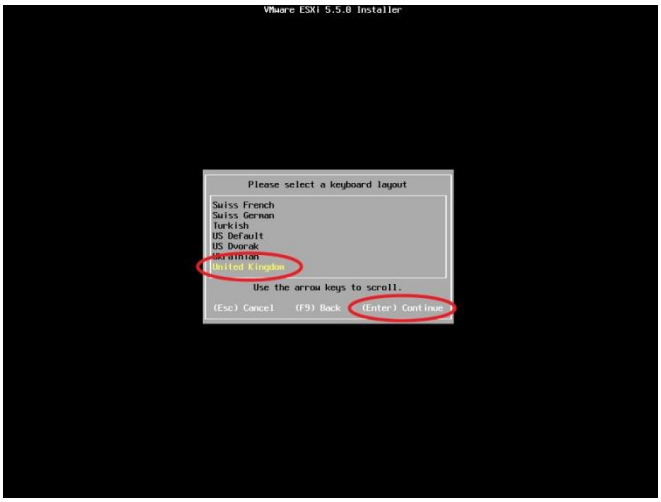

VMware ESXi 5.5.0 Installer
End User License Agreement (EULA)
VMWARE END USER LICENSE AGREEMENT
PLEASE NOTE THAT THE TERMS OF THIS END USER LICENSE AGREEMENT SHALL GOVERN YOUR USE OF THE SOFTWARE, REGARDLESS OF ANY TERMS THAT MAY APPEAR DURING THE INSTALLATION OF THE SOFTWARE.
IMPORTANT-READ CAREFULLY: BY DOWNLOADING, INSTALLING, OR USING THE SOFTWARE, YOU (THE INDIVIDUAL OR LEGAL ENTITY) AGREE TO BE BOUND BY THE TERMS OF THIS END USER LICENSE AGREEMENT ("EULA"). IF YOU DO NOT AGREE TO THE TERMS OF THIS EULA, YOU MUST NOT DOWNLOAD, INSTALL, OR USE THE SOFTWARE, AND YOU MUST DELETE OR RETURN THE UNUSED SOFTWARE TO THE VENDOR FROM WHICH YOU ACQUIRED IT WITHIN THIRTY (30) DAYS AND REQUEST A REFUND OF THE LICENSE FEE, IF ANY, THAT
Use the arrow keys to scroll the EULA text
(ESC) Do not Accept
(F11) Accept and Continue

j. The *ESXi* Installer scans for available devices

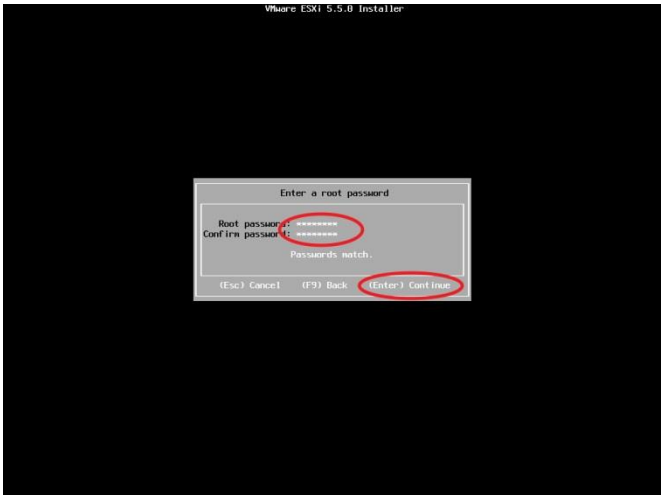
k. It locates all Storage Drives. Select the drive on which you want to install *ESXi* and press *Enter*



l. Select the appropriate keyboard layout and press *Enter* to continue

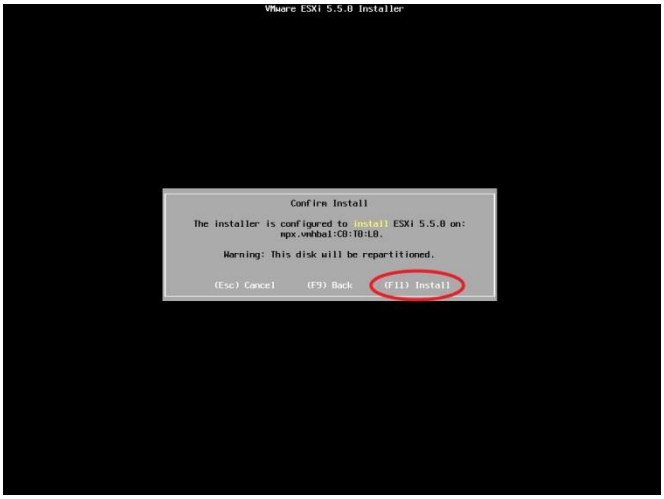


m. Create a root password and click *Enter*



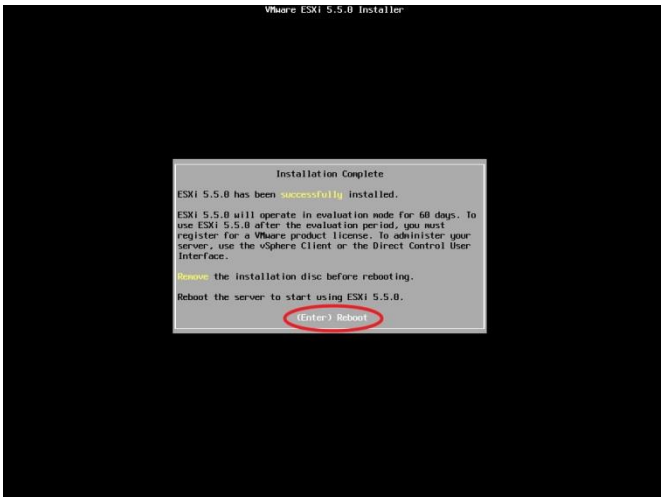
n. *ESXi* Installer scans the system

o. Once it is satisfied, it will allow you to confirm the installation. Press *F11* to confirm installation



p. The installation proceeds

q. Once complete, you must press *Enter* to reboot


VMware ESXi 5.5.0 Installer
Installation Complete
ESXi 5.5.0 has been successfully installed.
ESXi 5.5.0 will operate in evaluation mode for 60 days. To use ESXi 5.5.0 after the evaluation period, you must register for a VMware product license. To administer your server, use the vSphere Client or the Direct Control User Interface.
Remove the installation disc before rebooting.
Reboot the server to start using ESXi 5.5.0.
(Enter) Reboot

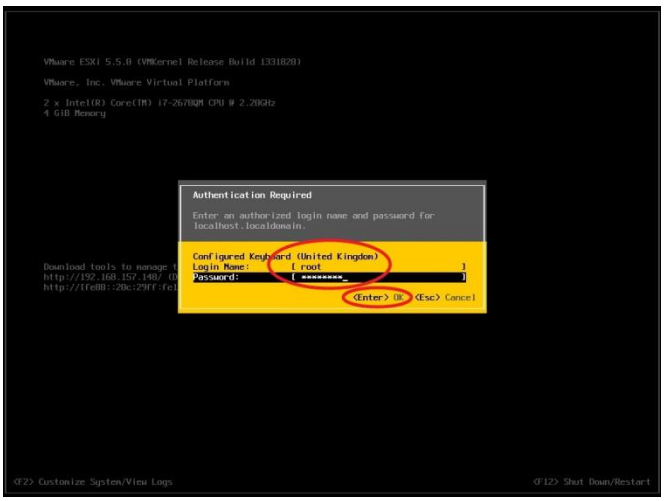
r. *ESXi* restarts the computer

VMware ESXi 5.5.0 Installer
Rebooting Server
The server will shut down and reboot.
The process will take a short time to complete.

s. Once fully loaded, the following screen appears. The IP address that appears is the IP address you use to connect to the *ESXi* Host through *vSphere Client*. You can press *F2* to Customise the system and view logs

VMware ESXi 5.5.0 (VMkernel Release Build 1331820)
VMware, Inc. VMware Virtual Platform
2 x Intel(R) Core(TM) i7-2670QM CPU @ 2.20GHz
4 GiB Memory
Download tools to manage this host from:
http://192.168.157.148/ (DHCP)
http://[fe80::20c:29ff:fe1a:81db]/ (STATIC)
<F2> Customize System/View Logs
<F12> Shut Down/Restart

t. You must enter the login name and password and then press *Enter*

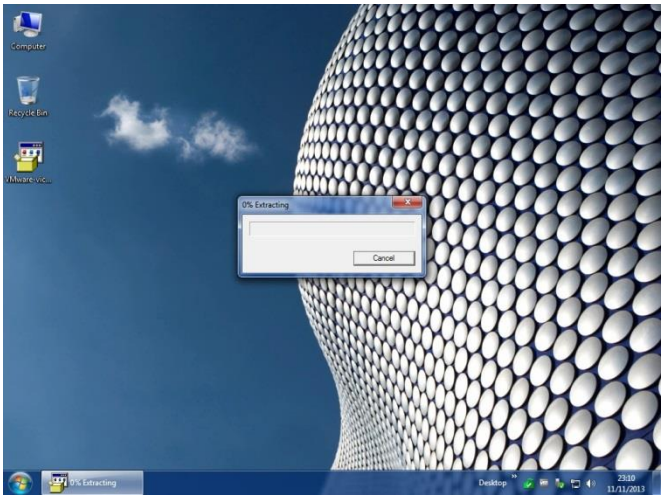

VMware ESXi 5.5.0 (VMkernel Release Build 1331820)
VMware, Inc. VMware Virtual Platform
2 x Intel(R) Core(TM) i7-2670QM CPU @ 2.20GHz
4 GiB Memory
Authentication Required
Enter an authorized login name and password for localhost.localdomain.
Configured Keyboard (United Kingdon)
Login Name: [root]
Password: [********_]
<Enter> OK <Esc> Cancel
<F2> Customize System/View Logs
<F12> Shut Down/Restart

u. Various configurations are accessible from here

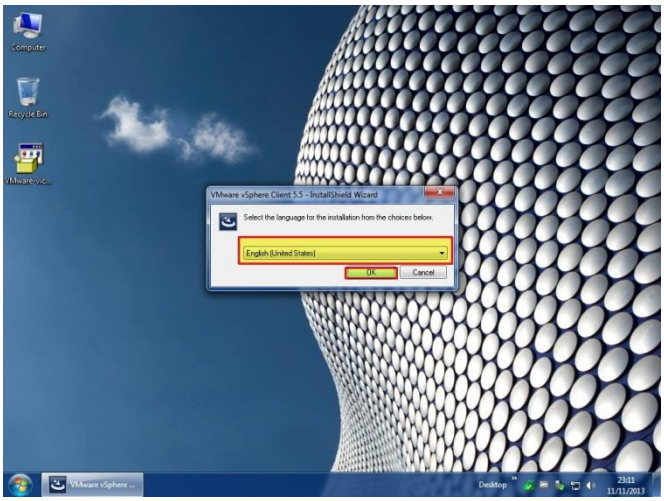
2. Install *vSphere Client.* Then connect to and access the *ESXi* Host

a. Double-click on the *vSphere Client* installation file

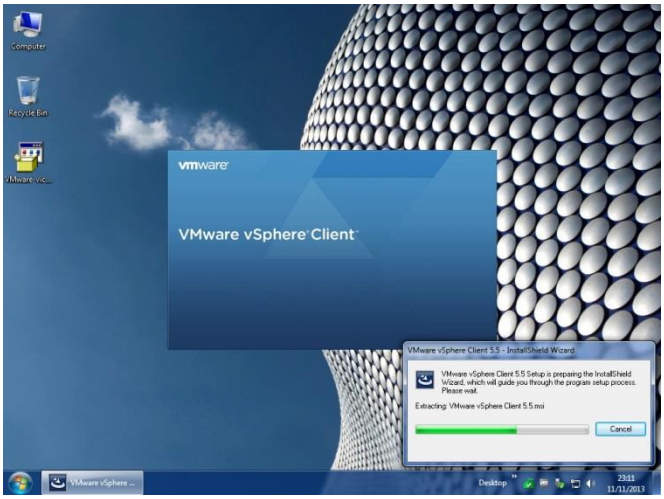
b. The file has to be extracted (done automatically)



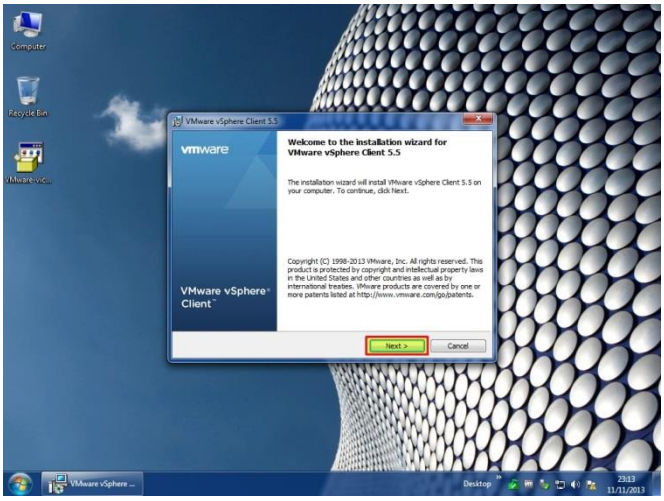
c. Select the appropriate language and click *OK*


VMware vSphere Client 5.5 - InstallShield Wizard
Select the language for the installation from the choices below.
English (United States)
OK
Cancel

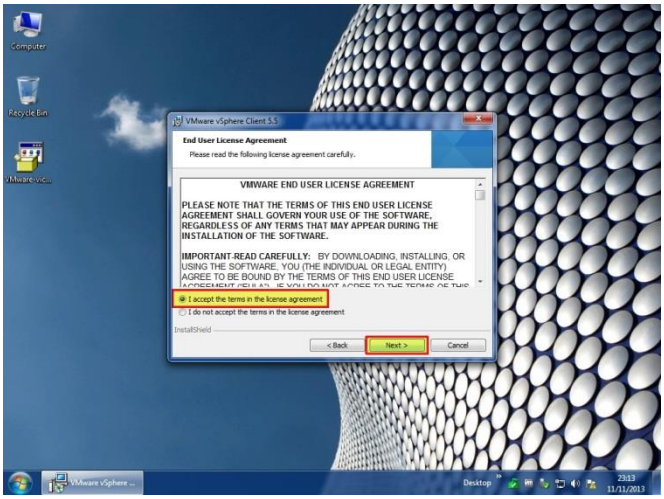
d. Allow *vSphere Client* to load the installation files


vmware
VMware vSphere Client
VMware vSphere Client 5.5 - InstallShield Wizard
VMware vSphere Client 5.5 Setup is preparing the InstallShield Wizard, which will guide you through the program setup process. Please wait.
Extracting: VMware vSphere Client 5.5.msi
Cancel

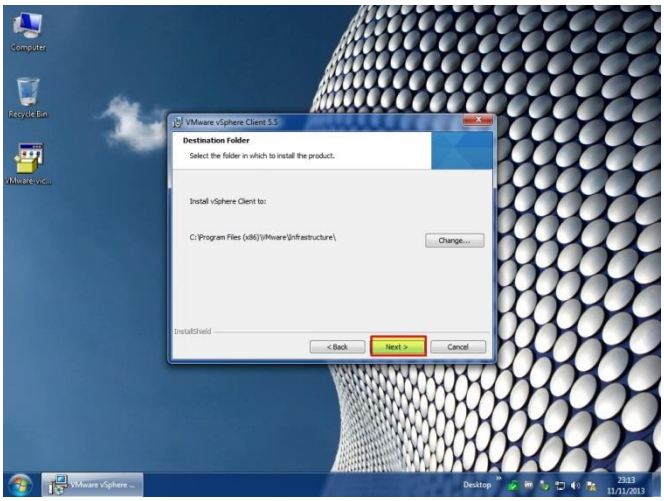
e. Follow the installation wizard. Click *Next*


VMware vSphere Client 5.5
vmware
Welcome to the installation wizard for VMware vSphere Client 5.5
The installation wizard will install VMware vSphere Client 5.5 on your computer. To continue, click Next.
Copyright (C) 1998-2013 VMware, Inc. All rights reserved. This product is protected by copyright and intellectual property laws in the United States and other countries as well as by international treaties. VMware products are covered by one or more patents listed at http://www.vmware.com/go/patents.
VMware vSphere Client
Next >
Cancel

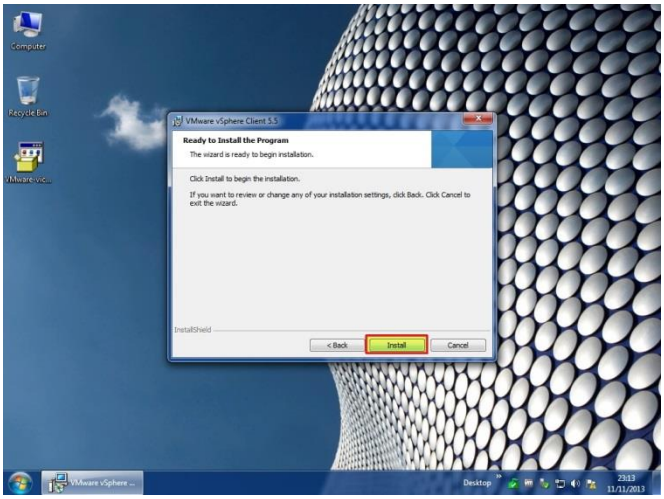
f. If satisfied, accept the terms in the licence agreement if satisfied and click *Next*


VMware vSphere Client 5.5
End User License Agreement
Please read the following license agreement carefully.
VMWARE END USER LICENSE AGREEMENT
PLEASE NOTE THAT THE TERMS OF THIS END USER LICENSE AGREEMENT SHALL GOVERN YOUR USE OF THE SOFTWARE, REGARDLESS OF ANY TERMS THAT MAY APPEAR DURING THE INSTALLATION OF THE SOFTWARE.
IMPORTANT-READ CAREFULLY: BY DOWNLOADING, INSTALLING, OR USING THE SOFTWARE, YOU (THE INDIVIDUAL OR LEGAL ENTITY) AGREE TO BE BOUND BY THE TERMS OF THIS END USER LICENSE
I accept the terms in the license agreement
I do not accept the terms in the license agreement
InstallShield
< Back
Next >
Cancel

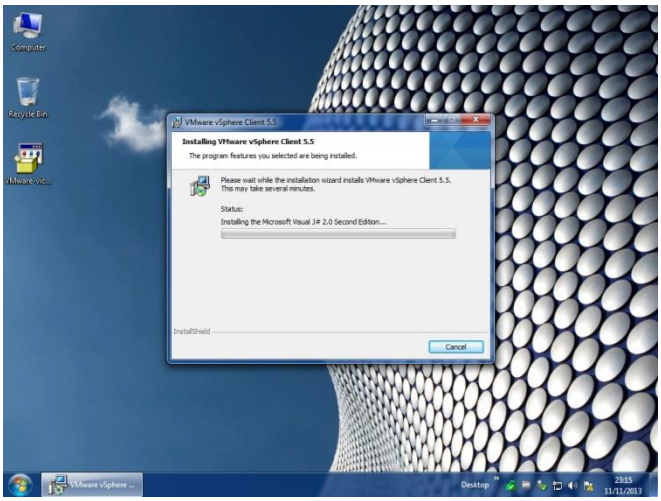
g. Select the appropriate folder (if you want to customise where it saves the program) and click *Next*



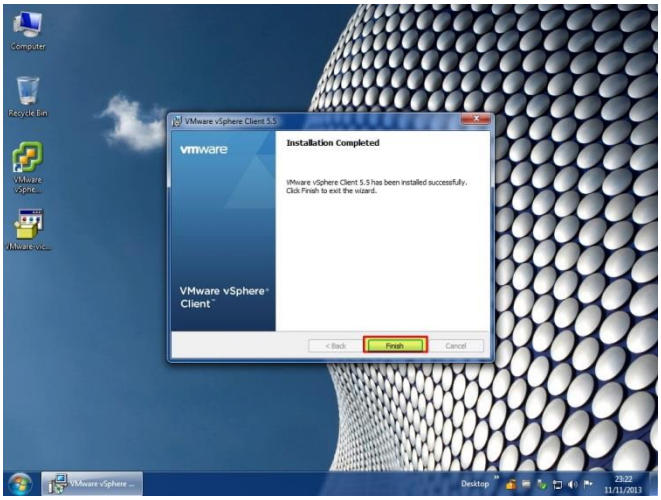
h. Once satisfied, click *Install* to proceed with the installation


VMware vSphere Client 5.5
Ready to Install the Program
The wizard is ready to begin installation.
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
InstallShield
< Back
Install
Cancel

i. The installation proceeds

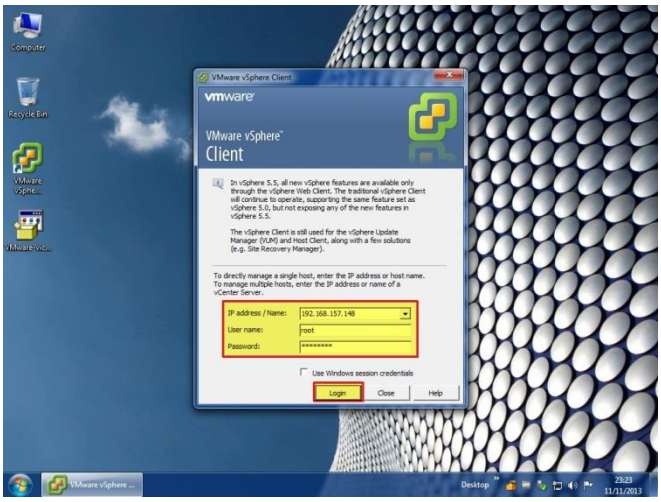

VMware vSphere Client 5.5
Installing VMware vSphere Client 5.5
The program features you selected are being installed.
Please wait while the installation wizard installs VMware vSphere Client 5.5. This may take several minutes.
Status:
Installing the Microsoft Visual J# 2.0 Second Edition...
InstallShield
Cancel

j. Once completed, click *Finish*

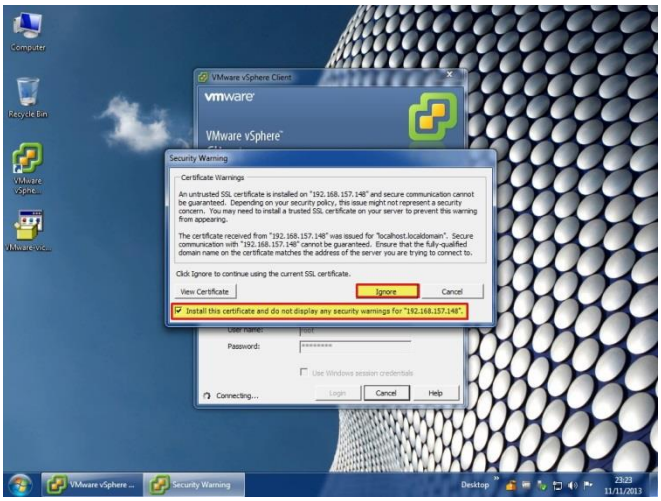


k. Double-click on *VMware vSphere Client*. A shortcut is automatically added to the Desktop

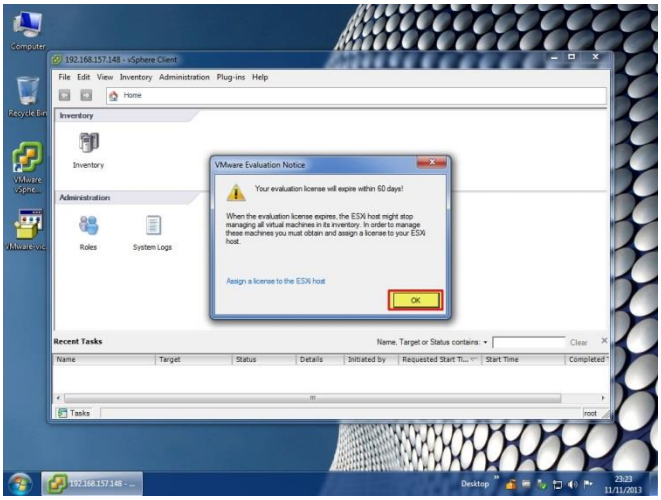
l. Enter the IP address mentioned when installing the *ESXi* host, as well as `'root'` as the username and the appropriate password. Then click *Login*



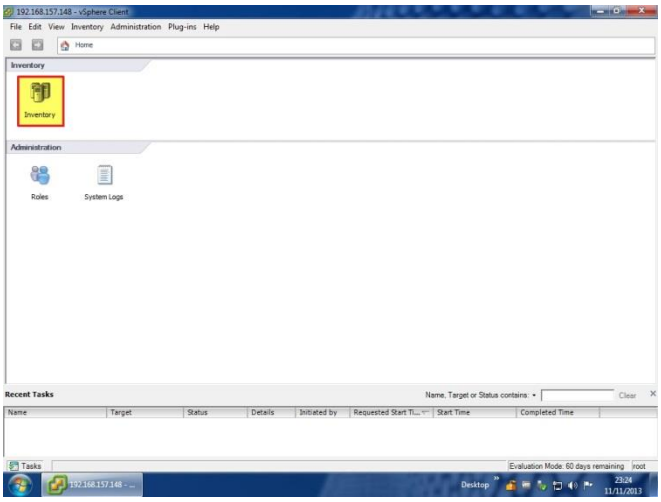
m. Check the box beside *Install this certificate and do not display any security warnings for 192.168.157.148* and then click *Ignore* (if you are happy with the security setup)



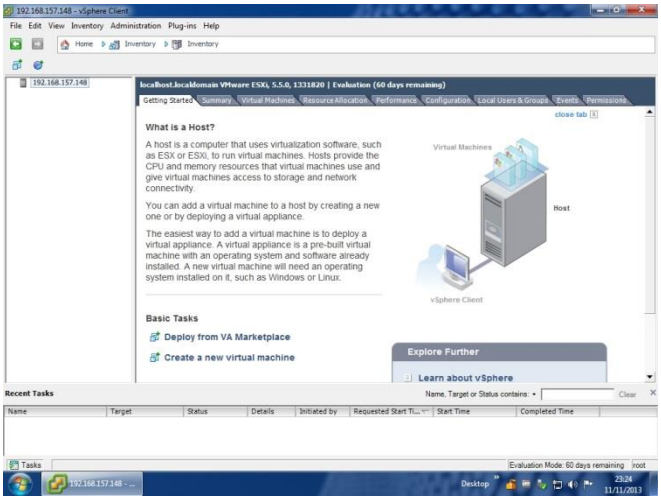
n. Click *OK* on the dialogue box that appears. This notifies you that the evaluation licence will expire in 60 days


VMware Evaluation Notice
Your evaluation license will expire within 60 days!
When the evaluation license expires, the ESXi host might stop managing all virtual machines in its inventory. In order to manage these machines you must obtain and assign a license to your ESXi host.
Assign a license to the ESXi host
OK
Recent Tasks

o. The Home Page of *vSphere Client* can be seen. Double click on *Inventory*



p. The *ESXi* host can now be seen. You can install Virtual Machines on the host from here



Task A.2 - Creating Virtual Machines using VMware ESXi and vSphere Client

Task Overview

According to *VMware*, '*VMware vCenter Server* provides a centralized platform for managing your *VMware vSphere* environments.'[15] It is essentially software that allows you to easily manage a *VMware vSphere* based virtualised environment. This could include anything from deploying a virtual machine to controlling what resources are available to a particular set of virtual machines. The vast majority of administration tasks relating to virtualisation can be completed using this software. As a result, it is an absolutely central to managing any environment virtualised using *VMware vSphere*, especially if it is being used within a large enterprise. It is basically a more powerful alternative to the basic *vSphere Client* interface.

Now that we've connected to the *ESXi* host through *vSphere Client*, we can move on to setting up *vCenter Server* on machine 1. In order to do this, some pre-installation steps must be performed. Firstly *Windows Server* must be connected to a domain. Both versions of *vCenter Server* (*Windows Server* installable and the *Virtual Appliance*) can connect to an existing *Active Directory* if necessary.[16] As well as this, the server should be assigned a static IP address and host name. This is to ensure that the IP address of the *vCenter Server* never changes. As both of these (connecting to a domain and assigning static IP addresses and host names) were documented in a previous assignment, we are going to skip these steps. However, they are essential steps when setting up a *vSphere* environment correctly. A *vCenter Server* database should then be setup, unless using the default database.[17] Finally you must ensure that the *vCenter Server* hardware and software requirements are met. In this task, we are going to install the *Windows* installable version of *vCenter Server*.

There are two different ways of installing *vCenter Server* on *Windows*. You can do a simple install, or a custom. The simple version install installs all of the software associated with *vCenter Server*. However, this is currently prone to errors (as *VMware* 5.5 has just been released). Hence we will do a Custom Install. The Custom Install gives you more configuration options and you install all of the different software components required separately. This involves 4 installations; *vCenter Single Sign-On*, *vSphere Web Client*, *vCenter Inventory Service* and finally *vCenter Server*. One of the reasons *VMware* offer the Custom Install is so that you can install the various components on different machines if you want. All of these components are required for *vCenter Server* to fully function.

On machine 2, the *Windows 7* operating system will be installed, along with *vSphere Client* as in the previous task.

For further information relating to the task outlined, please see Scott Lowe's Mastering VMware vSphere 5, Chapter 3. [18]

The Differences between vCenter Server and vCenter Server Appliance

There are two versions of *vCenter Server*. The *vCenter Server* that is installed on a guest Operating System and the *vCenter Server Appliance* (*vCSA*). There are advantages and disadvantages to both the OS-based and *vCSA* versions of *vCenter Server*. Firstly, I will discuss the advantages and disadvantages relating to the OS-based version of *vCenter Server*.

Firstly, *vCenter Server* must be installed on a supported Operating System, such as *Windows Server 2008 R2*. *Windows Server* must initially be installed, and then *vCenter Server* must be installed like an application. This can be quite time consuming for an administrator, especially if there are any problems. As well as this, the guest OS must be licenced. For example, if *Windows Server 2008 R2* is being used, the associated licence must be bought. You also have the footprint of the Operating System. Many of the services offered by this OS may be of no use, yet you are still required to install them. These can use resources unnecessarily.

Next I will compare this to *vCSA*. The advantages are that *vCSA* is very easy to deploy. You simply import the virtual machine and power it on. There are pre-installed features on this such as AHCP, Auto-Deploy TFTP and Syslog.[19] As well as this, there are no licencing issues as there is no licence required. However, as it is *Linux* based, there may be a learning curve. The main issue is that it does not support Linked Mode. Linked Mode 'enables a common inventory view across multiple instances of *vCenter Server*.'[20] As a result, you can have 3000 hosts, 30000 powered-on virtual machines and 50000 registered virtual machines in linked *vCenter Servers*. This compares to the maximum supported numbers for *vCSA*: 100 ESXi hosts and 3000 virtual machines.[21] As well as this, it does not support IPv6, is not available for installation on a physical machine and some database programmes are not supported.[22]

The following table is taken from the *VMware* website.[23] It directly compares *vCenter Server* and *vCenter Server Appliance*. Note that this relates to *vCenter Server* 5.1.

Features	**vCenter Server**	**vCenter Server Appliance**
Guest OS	Any Supported Guest OS	Preconfigured Linux-based virtual machine (64-bit SUSE Linux Enterprise Server 11)
Database	Supported Versions SQL Server and Oracle.	PostgreSQL (built-in) can have 5 hosts and 50 Virtual Machines.Supported External Oracle database.
System Requirement	2 vCPU and 4 GB RAM	2 vCPU and 4 GB RAM
Platform	Physical or virtual machine	Virtual Appliance
Installation	Using binary provided in .zip or .ISO	Deploying OVF
Update Manager	Can be installed on same vCenter Server or on separate Guest OS.	Separate install
Single Sign On (SSO)	Can be installed on same vCenter Server or separate Guest OS.	Pre-installed.
Networking	IPv6 and IPv4 Support	IPv4 Support

Linked Mode	Supported	Not Supported
SRM (Site Recovery Manager)	Compatible with SRM	Compatible with SRM
vSphere Web Client	Can be installed on same vCenter server or separate machine.	Pre-Installed.
Syslog Server	Can be installed on vCenter Server or separate server and configured using plug-in.	Pre-installed and does not have plug-in.
ESXi Dump collector	Can be installed on vCenter Server or on a separate Guest OS.	Pre-installed and does not have plug-in.
Multi-site SSO	Supported	Not Supported. Basic SSO only.
VSA (vSphere Storage Appliance	Supported	Not Supported
VMware View	Supported	Not Supported

In conclusion, the *vCSA* edition is often used for small scale implementations of the *vSphere* suite. However, as it does not support *Linked Mode*, it is not the obvious solution for large scale implementations. As a result, the *vCenter Server* is usually installed within a *Windows Server*. However, both versions have their advantages and both can be suitable depending on the environment being setup.

Technical Issues

The following system requirements for *Windows Server 2008* are taken directly from the *Microsoft* website[24]:

Component	**Requirement**
Processor	• Minimum: 1 GHz (x86 processor) or 1.4 GHz (x64 processor) • Recommended: 2 GHz or faster **Note:** An Intel Itanium 2 processor is required for Windows Server 2008 for Itanium-Based Systems.
Memory	• Minimum: 512 MB RAM • Recommended: 2 GB RAM or greater • Maximum (32-bit systems): 4 GB (Standard) or 64 GB (Enterprise and Datacenter) • Maximum (64-bit systems): 32 GB (Standard) or 1 TB (Enterprise and Datacenter) or 2 TB (Itanium-Based Systems)

Component	Requirement
Available Disk Space	• Minimum: 10 GB • Recommended: 40 GB or greater **Note:** Computers with more than 16 GB of RAM will require more disk space for paging, hibernation, and dump files.
Drive	DVD-ROM drive
Display and Peripherals	• Super VGA (800 x 600) or higher-resolution monitor • Keyboard • Microsoft Mouse or compatible pointing device

The following are the minimum hardware requirements for *vCenter Server 5.1* are taken directly from the *VMware* website[25]. For hardware requirements relating to specific components, please visit reference given.

vCenter Server Hardware	Requirement
CPU	Two 64-bit CPUs or one 64-bit dual-core processor.
Processor	2.0GHz or faster Intel 64 or AMD 64 processor. The Itanium (IA64) processor is not supported. Processor requirements might be higher if the database runs on the same machine.
Memory	The amount of memory needed depends on your vCenter Server configuration. ■ If vCenter Server is installed on a different host machine than vCenter Single Sign On and vCenter Inventory Service, 4GB of RAM are required. ■ If vCenter Server, vCenter Single Sign On and vCenter Inventory Service are installed on the same host machine (as with vCenter Simple Install), 10GB of RAM are required. Memory requirements are higher if the vCenter Server database or vCenter Single Sign On database runs on the same machine as vCenter Server. vCenter Server includes several Java services: VMware VirtualCenter Management Webservices (tc Server), Inventory Service, and Profile-Driven Storage Service. When you install vCenter Server, you select the size of your vCenter Server inventory to allocate memory for

	these services. The inventory size determines the maximum JVM heap settings for the services. You can adjust this setting after installation if the number of hosts in your environment changes. See the recommendations in JVM Heap Settings for vCenter Server.
Disk storage	The amount of disk storage needed for the vCenter Server installation depends on your vCenter Server configuration. ■ If vCenter Server is installed on a different host machine than vCenter Single Sign On and vCenter Inventory Service, 4GB are required. ■ If vCenter Server, vCenter Single Sign On and vCenter Inventory Service are installed on the same host machine (as with vCenter Simple Install), at least 40-60GB of free disk space are required after installation, depending on the size of your inventory. 100GB are recommended, to allow for future growth of your inventory. Disk storage requirements are higher if the vCenter Server database or vCenter Single Sign On database runs on the same machine as vCenter Server, depending on the size of those databases. In vCenter Server 5.x, the default size for vCenter Server logs is 450MB larger than in vCenter Server 4.x. Make sure the disk space allotted to the log folder is sufficient for this increase.
Microsoft SQL Server 2008 R2 Express disk	Up to 2GB free disk space to decompress the installation archive. Approximately 1.5GB of these files are deleted after the installation is complete.
Network speed	1Gbps

The following system requirements for *Windows 7* are taken directly from the *Microsoft* website[26]:

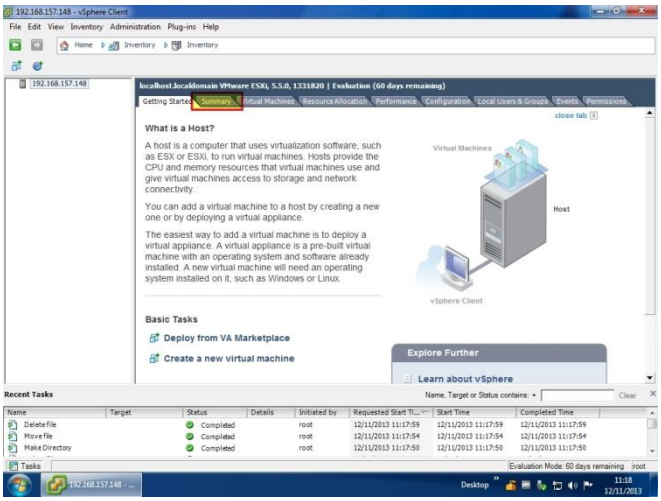
- 1 gigahertz (GHz) or faster 32-bit (x86) or 64-bit (x64) processor
- 1 gigabyte (GB) RAM (32-bit) or 2 GB RAM (64-bit)
- 16 GB available hard disk space (32-bit) or 20 GB (64-bit)
- DirectX 9 graphics device with WDDM 1.0 or higher driver

The software and hardware requirements relating to *vSphere Client* were detailed in the previous Technical Issues section of Task A.1.

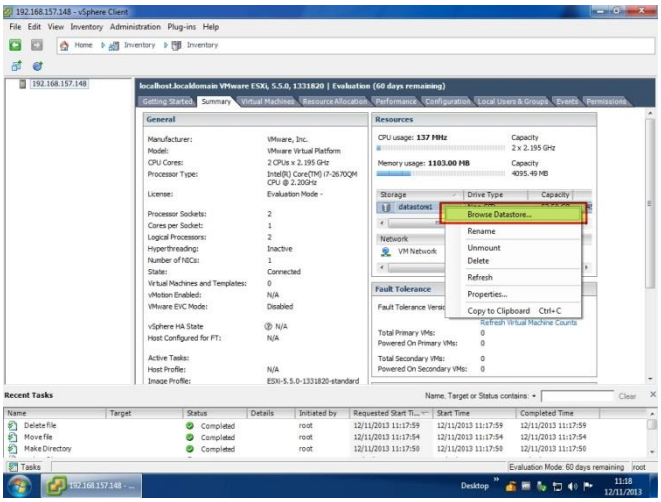
Task Guide

1. **Upload both Operating System ISO image files as well as the *vCenter Server* ISO image file to the *Datastore***

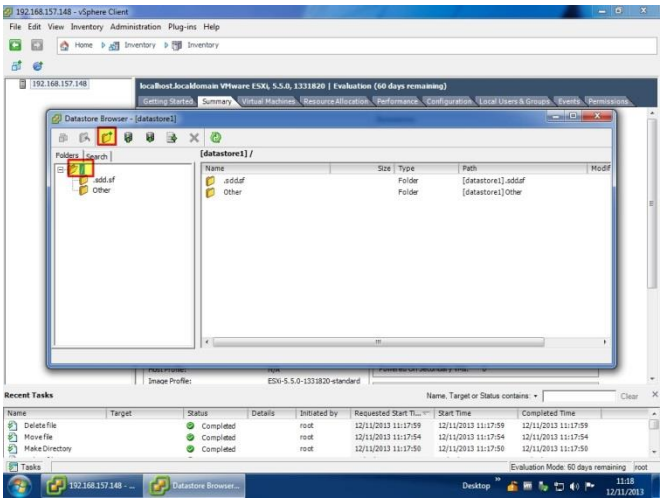
    a. Within *vSphere Client*, Select the *Summary* tab


192.168.157.148 - vSphere Client
File Edit View Inventory Administration Plug-ins Help
Home Inventory Inventory
192.168.157.148
localhost.localdomain VMware ESXi, 5.5.0, 1331820 | Evaluation (60 days remaining)
Getting Started Summary Virtual Machines Resource Allocation Performance Configuration Local Users & Groups Events Permissions
close tab
What is a Host?
A host is a computer that uses virtualization software, such as ESX or ESXi, to run virtual machines. Hosts provide the CPU and memory resources that virtual machines use and give virtual machines access to storage and network connectivity.
You can add a virtual machine to a host by creating a new one or by deploying a virtual appliance.
The easiest way to add a virtual machine is to deploy a virtual appliance. A virtual appliance is a pre-built virtual machine with an operating system and software already installed. A new virtual machine will need an operating system installed on it, such as Windows or Linux.
Virtual Machines
Host
vSphere Client
Basic Tasks
Deploy from VA Marketplace
Create a new virtual machine
Explore Further
Learn about vSphere
Recent Tasks
Name Target Status Details Initiated by Requested Start Ti... Start Time Completed Time
Delete file Completed root 12/11/2013 11:17:59 12/11/2013 11:17:59 12/11/2013 11:17:59
Move file Completed root 12/11/2013 11:17:54 12/11/2013 11:17:54 12/11/2013 11:17:54
Make Directory Completed root 12/11/2013 11:17:50 12/11/2013 11:17:50 12/11/2013 11:17:50
Tasks
Evaluation Mode: 60 days remaining root
Desktop
11:18
12/11/2013

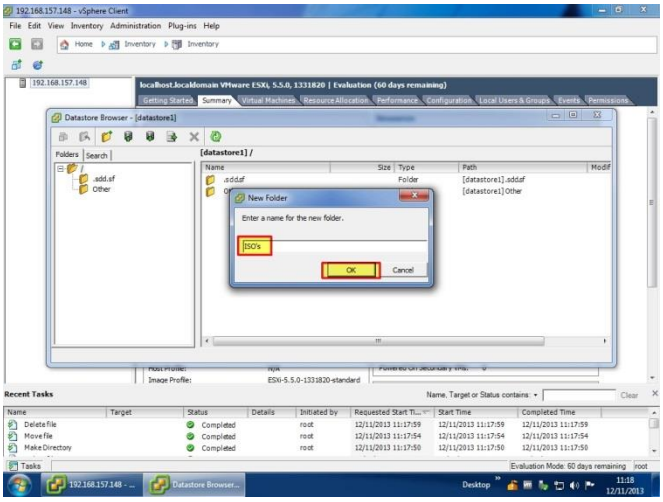
    b. Right-click on the *Datastore* and select *Browse Datastore…*


192.168.157.148 - vSphere Client
File Edit View Inventory Administration Plug-ins Help
Home Inventory Inventory
192.168.157.148
localhost.localdomain VMware ESXi, 5.5.0, 1331820 | Evaluation (60 days remaining)
Getting Started Summary Virtual Machines Resource Allocation Performance Configuration Local Users & Groups Events Permissions
General
Manufacturer: VMware, Inc.
Model: VMware Virtual Platform
CPU Cores: 2 CPUs x 2.195 GHz
Processor Type: Intel(R) Core(TM) i7-2670QM CPU @ 2.20GHz
License: Evaluation Mode
Processor Sockets: 2
Cores per Socket: 1
Logical Processors: 2
Hyperthreading: Inactive
Number of NICs: 1
State: Connected
Virtual Machines and Templates: 0
vMotion Enabled: N/A
VMware EVC Mode: Disabled
vSphere HA State N/A
Host Configured for FT: N/A
Active Tasks:
Host Profile: N/A
Image Profile: ESXi-5.5.0-1331820-standard
Resources
CPU usage: 137 MHz Capacity 2 x 2.195 GHz
Memory usage: 1103.00 MB Capacity 4095.49 MB
Storage Drive Type Capacity
datastore1
Network
VM Network
Fault Tolerance
Fault Tolerance Version
Total Primary VMs: 0
Powered On Primary VMs: 0
Total Secondary VMs: 0
Powered On Secondary VMs: 0
Browse Datastore...
Rename
Unmount
Delete
Refresh
Properties...
Copy to Clipboard Ctrl+C
Refresh Virtual Machine Counts
Recent Tasks
Name Target Status Details Initiated by Requested Start Ti... Start Time Completed Time
Delete file Completed root 12/11/2013 11:17:59 12/11/2013 11:17:59 12/11/2013 11:17:59
Move file Completed root 12/11/2013 11:17:54 12/11/2013 11:17:54 12/11/2013 11:17:54
Make Directory Completed root 12/11/2013 11:17:50 12/11/2013 11:17:50 12/11/2013 11:17:50
Tasks
Evaluation Mode: 60 days remaining root
Desktop
11:18
12/11/2013

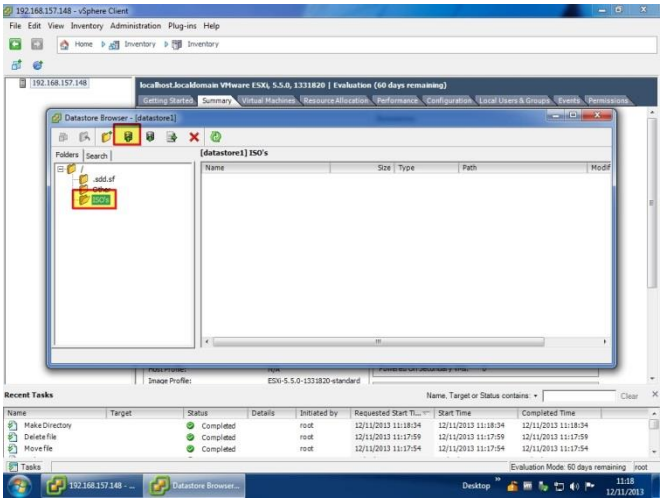
c. Create a folder for the ISO's by clicking the create folder button



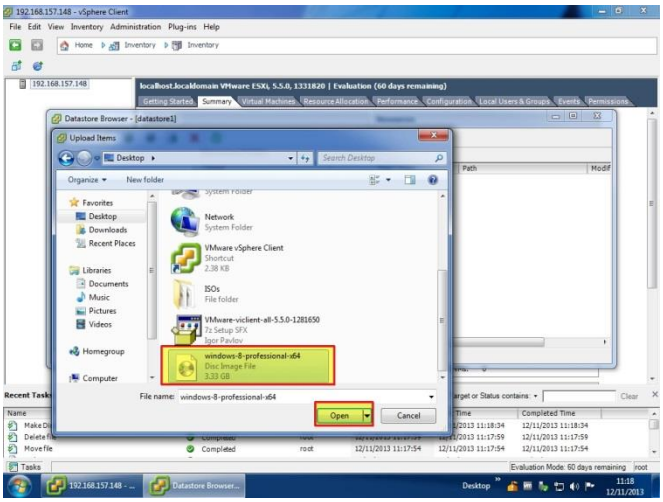
d. Name it ISO's



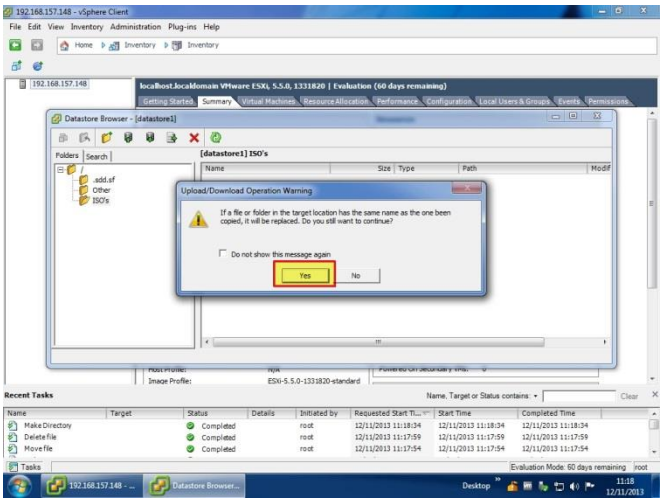
e. Click the *ISO's folder* on the right and click the *Upload to Datastore* button



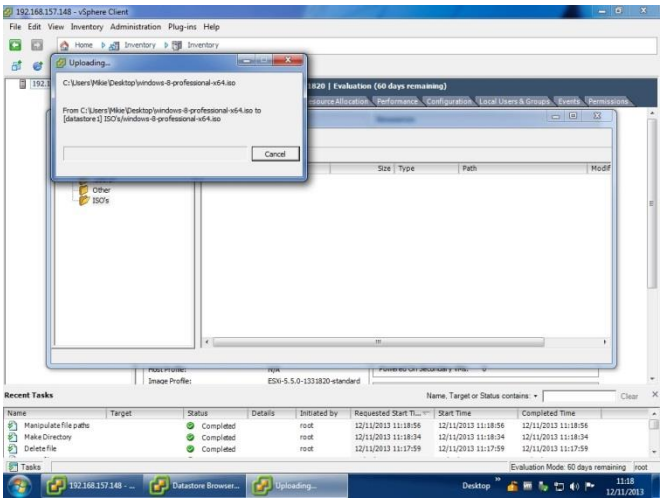
f. Select the appropriate ISO image file from your local hard drive



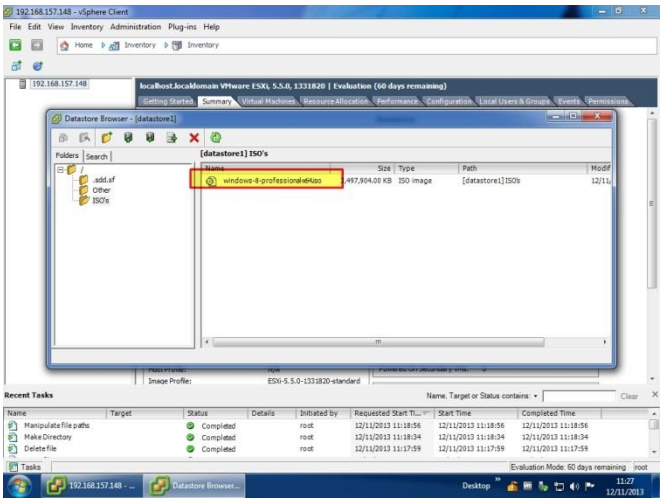
g. A warning appears stating that if a file or folder in the target location has the same name as the one being copied, it will be replace. Note this and click *Yes*


192.168.157.148 - vSphere Client
Datastore Browser - [datastore1]
[datastore1] ISO's
Upload/Download Operation Warning
If a file or folder in the target location has the same name as the one been copied, it will be replaced. Do you still want to continue?
Do not show this message again
Yes
No

h. The ISO image file will upload to the *Datastore*. This can take some time

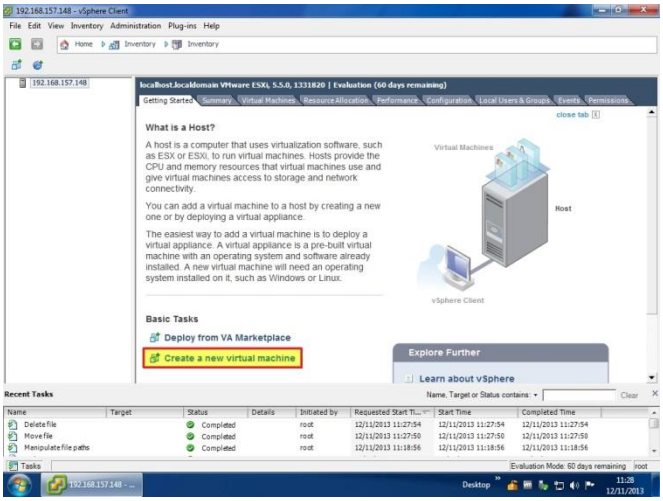


i. The ISO image file now appears within the ISO's folder in the *Datastore*

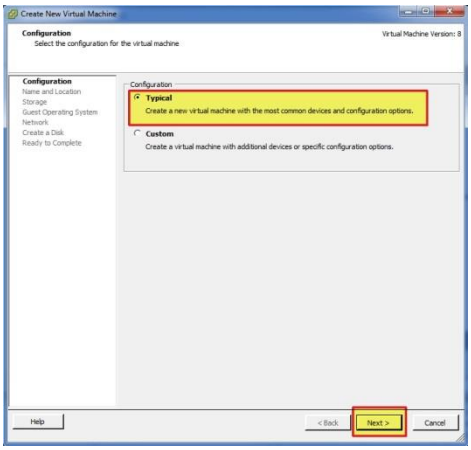


2. Create a New Virtual Machine

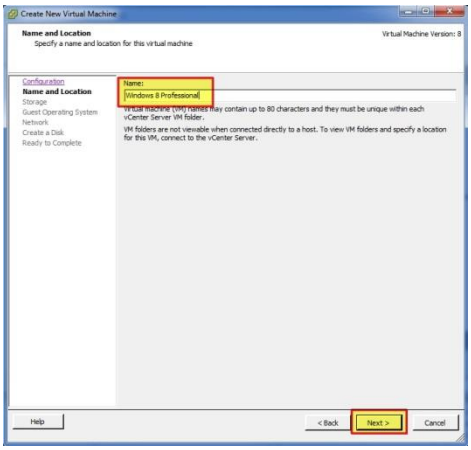
a. Within *vSphere Client*, click on the *Getting Started* tab and click *Create a new virtual machine*



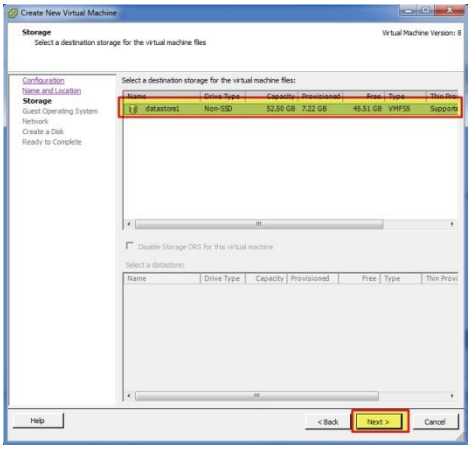
b. Select *Typical* as the configuration and click *Next >*


Create New Virtual Machine
Configuration
Typical
Create a new virtual machine with the most common devices and configuration options.
Custom
Create a virtual machine with additional devices or specific configuration options.
Help
< Back
Next >
Cancel

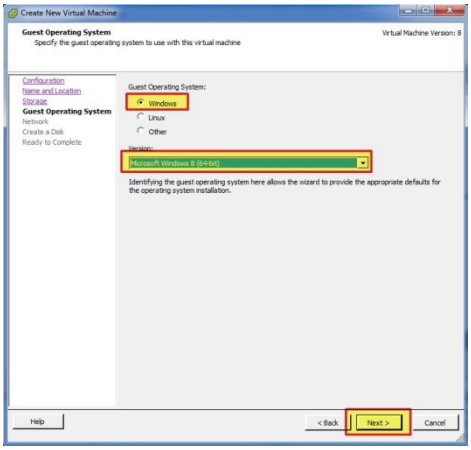
c. Name the virtual machine appropriately and click *Next >*



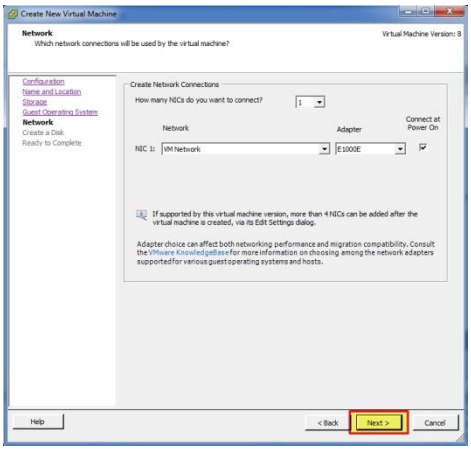
d. Select the storage location for the virtual machine files and click *Next >*



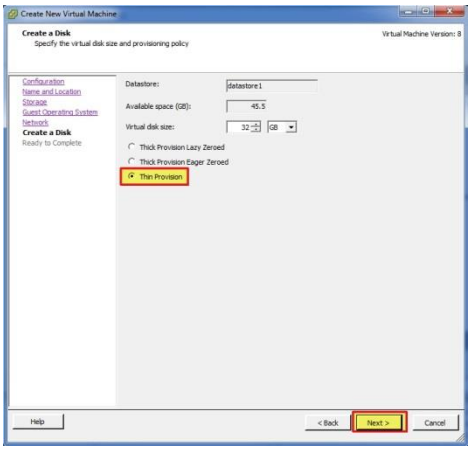
e. Select the appropriate Operating System and click *Next >*



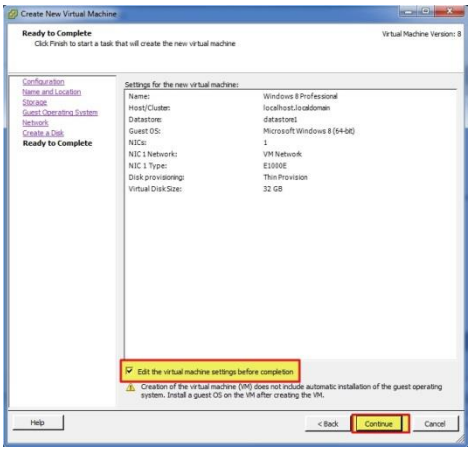
f. Create Network Connections as necessary and click *Next >*


Create New Virtual Machine
Network
Which network connections will be used by the virtual machine?
Virtual Machine Version: 8
Configuration
Name and Location
Storage
Guest Operating System
Network
Create a Disk
Ready to Complete
Create Network Connections
How many NICs do you want to connect?
Network
Adapter
Connect at Power On
NIC 1:
VM Network
E1000E
If supported by this virtual machine version, more than 4 NICs can be added after the virtual machine is created, via its Edit Settings dialog.
Adapter choice can affect both networking performance and migration compatibility. Consult the VMware KnowledgeBase for more information on choosing among the network adapters supported for various guest operating systems and hosts.
Help
< Back
Next >
Cancel

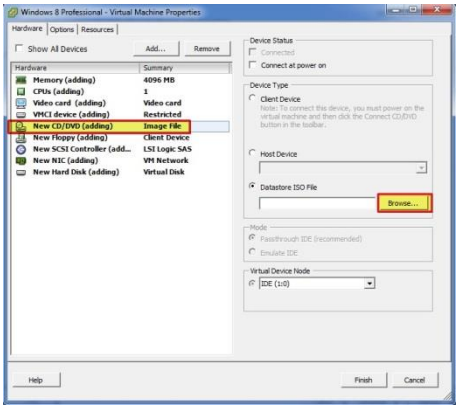
g. Select the required virtual disk space and click *Thin Provision*. Then click *Next >*



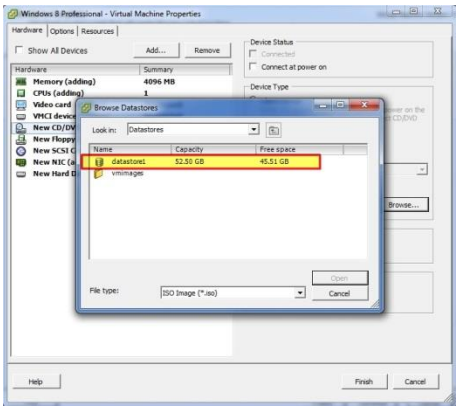
h. Confirm the virtual machine settings, click *Edit the virtual machine settings before completion*, and click *Continue*



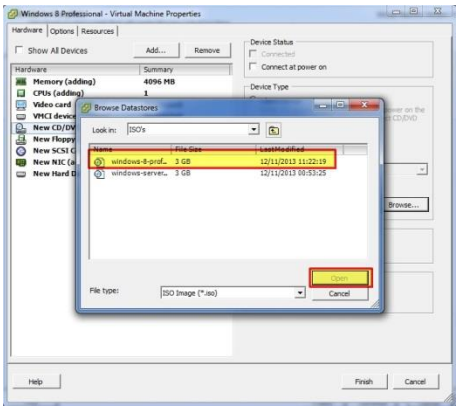
i. Within the Hardware tab, click *New CD/DVD (adding)*. Select *Datastore ISO File* as the Device Type and click *Browse…*



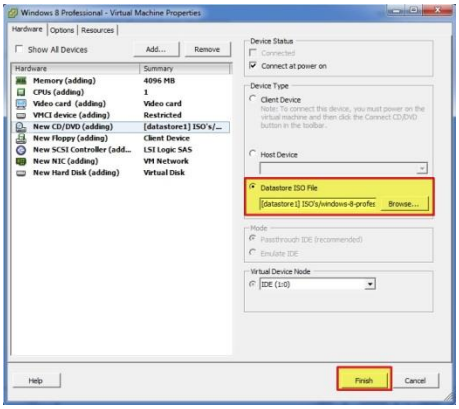
j. Open the appropriate *Datastore*



k. Select the appropriate ISO image file and click *Open*

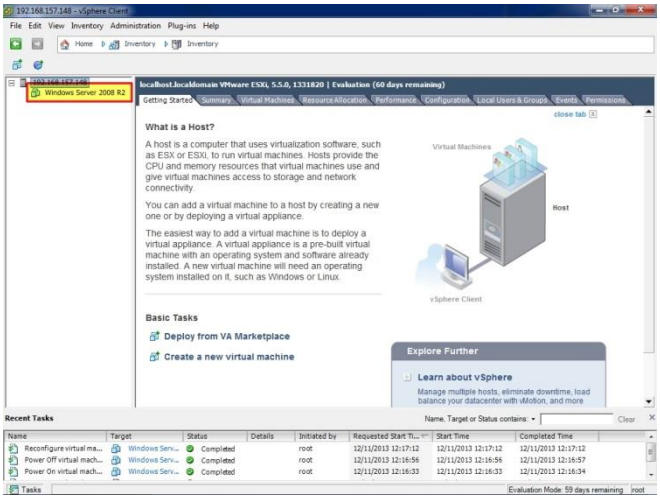


l. The location of the selected ISO image file will now show up so you can now click *Finish*

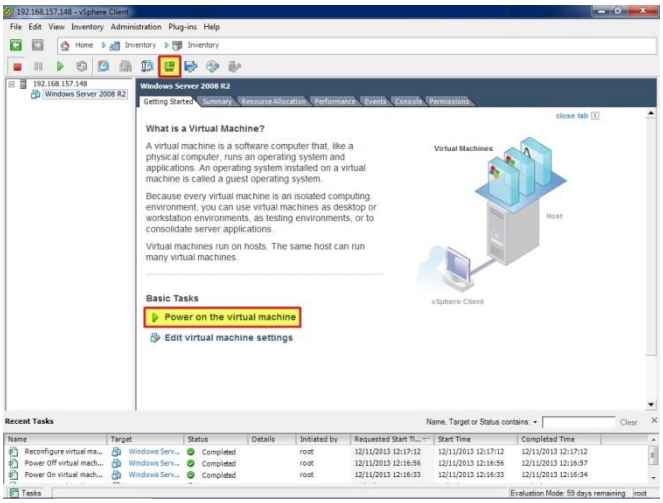


3. Install *Windows Server 2008 R2* Operating System

a. Click on the virtual machine that you just created


File Edit View Inventory Administration Plug-ins Help
Home
Inventory
Windows Server 2008 R2
localhost.localdomain VMware ESXi, 5.5.0, 1331820 | Evaluation (60 days remaining)
Getting Started
Summary
Virtual Machines
Resource Allocation
Performance
Configuration
Local Users & Groups
Events
Permissions
close tab
What is a Host?
A host is a computer that uses virtualization software, such as ESX or ESXi, to run virtual machines. Hosts provide the CPU and memory resources that virtual machines use and give virtual machines access to storage and network connectivity.
You can add a virtual machine to a host by creating a new one or by deploying a virtual appliance.
The easiest way to add a virtual machine is to deploy a virtual appliance. A virtual appliance is a pre-built virtual machine with an operating system and software already installed. A new virtual machine will need an operating system installed on it, such as Windows or Linux.
Virtual Machines
Host
vSphere Client
Basic Tasks
Deploy from VA Marketplace
Create a new virtual machine
Explore Further
Learn about vSphere
Manage multiple hosts, eliminate downtime, load balance your datacenter with vMotion, and more
Recent Tasks
Name, Target or Status contains:
Clear
Name
Target
Status
Details
Initiated by
Requested Start Ti...
Start Time
Completed Time
Reconfigure virtual ma...
Power Off virtual mach...
Power On virtual mach...
Completed
root
12/11/2013 12:17:12
12/11/2013 12:16:56
12/11/2013 12:16:33
Tasks
Evaluation Mode: 59 days remaining
root

b. Click *Power on the virtual machine*



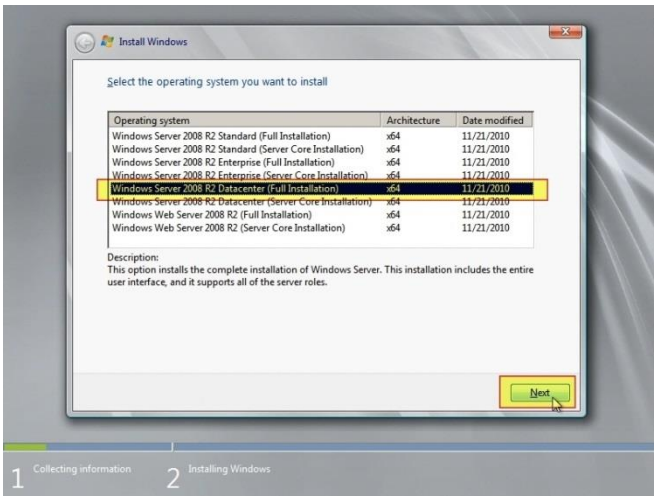
c. Select the appropriate settings and click *Next*

Install Windows
Windows Server 2008 R2
Language to install: English
Time and currency format: English (Ireland)
Keyboard or input method: Irish
Enter your language and other preferences and click "Next" to continue.
Copyright © 2009 Microsoft Corporation. All rights reserved.
Next

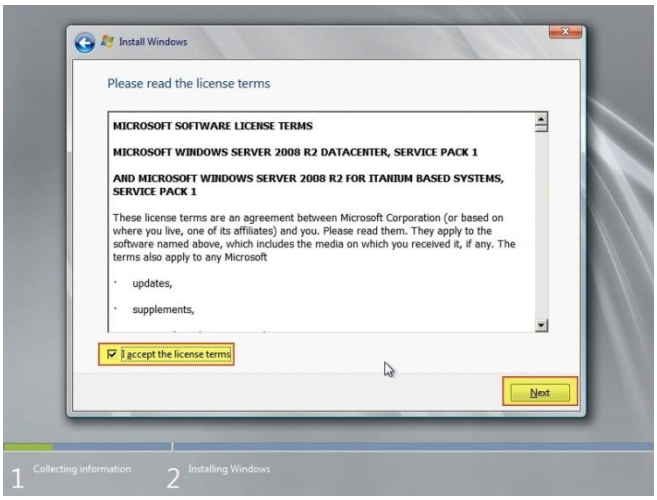
d. Click the button to the right of *Install Now*

Install Windows
Windows Server 2008 R2
Install now
What to know before installing Windows
Repair your computer
Copyright © 2009 Microsoft Corporation. All rights reserved.

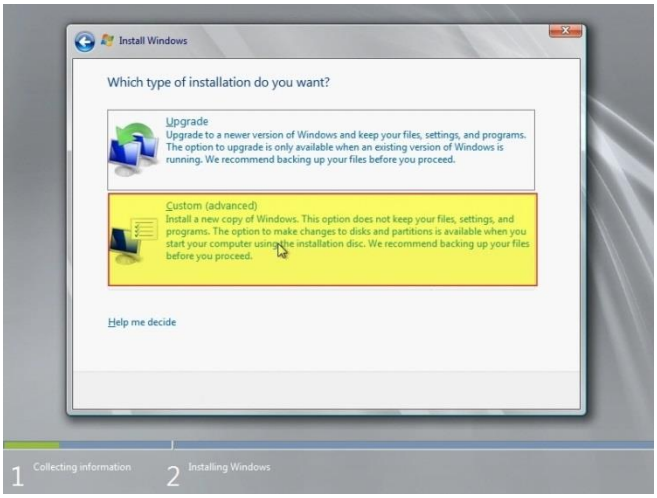
e. Select the version of *Windows Server 2008 R2* that you want to install and click *Next*


Install Windows
Select the operating system you want to install
Operating system | Architecture | Date modified
Windows Server 2008 R2 Standard (Full Installation) x64 11/21/2010
Windows Server 2008 R2 Standard (Server Core Installation) x64 11/21/2010
Windows Server 2008 R2 Enterprise (Full Installation) x64 11/21/2010
Windows Server 2008 R2 Enterprise (Server Core Installation) x64 11/21/2010
Windows Server 2008 R2 Datacenter (Full Installation) x64 11/21/2010
Windows Server 2008 R2 Datacenter (Server Core Installation) x64 11/21/2010
Windows Web Server 2008 R2 (Full Installation) x64 11/21/2010
Windows Web Server 2008 R2 (Server Core Installation) x64 11/21/2010
Description:
This option installs the complete installation of Windows Server. This installation includes the entire user interface, and it supports all of the server roles.
Next
1 Collecting information
2 Installing Windows

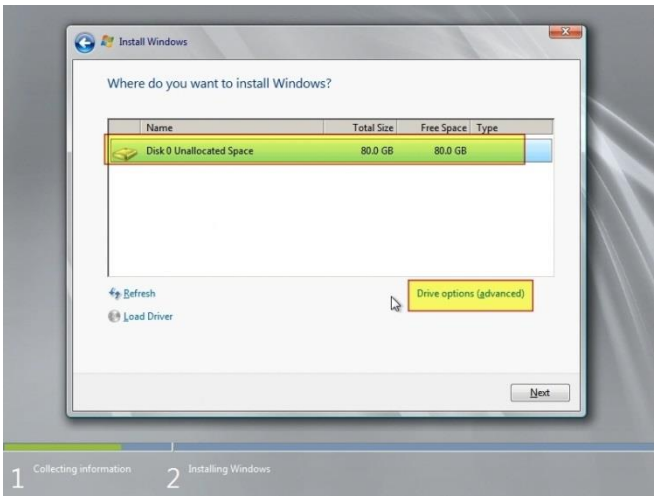
f. Click *I accept the licence terms* and click *Next*


Install Windows
Please read the license terms
MICROSOFT SOFTWARE LICENSE TERMS
MICROSOFT WINDOWS SERVER 2008 R2 DATACENTER, SERVICE PACK 1
AND MICROSOFT WINDOWS SERVER 2008 R2 FOR ITANIUM BASED SYSTEMS, SERVICE PACK 1
These license terms are an agreement between Microsoft Corporation (or based on where you live, one of its affiliates) and you. Please read them. They apply to the software named above, which includes the media on which you received it, if any. The terms also apply to any Microsoft
updates,
supplements,
I accept the license terms
Next
1 Collecting information
2 Installing Windows

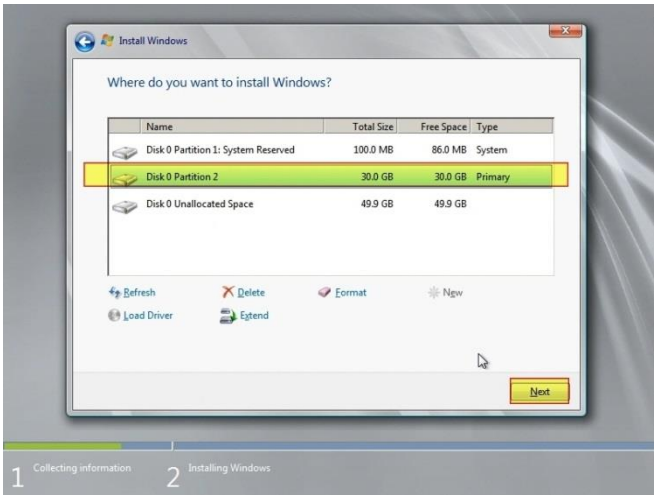
g. Select *Custom (advanced)* when asked which type of installation you want


Install Windows
Which type of installation do you want?
Upgrade
Upgrade to a newer version of Windows and keep your files, settings, and programs. The option to upgrade is only available when an existing version of Windows is running. We recommend backing up your files before you proceed.
Custom (advanced)
Install a new copy of Windows. This option does not keep your files, settings, and programs. The option to make changes to disks and partitions is available when you start your computer using the installation disc. We recommend backing up your files before you proceed.
Help me decide
1 Collecting information
2 Installing Windows

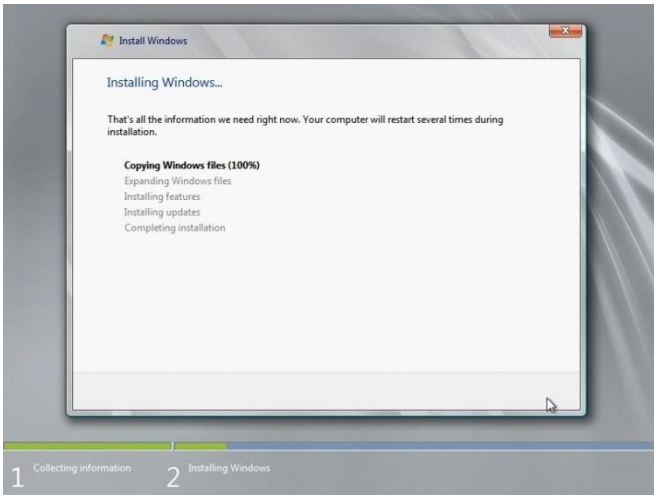
h. Select the hard disk drive that you want to install the Operating System on. If you want to first partition the drive, click *Drive Options (advanced)*



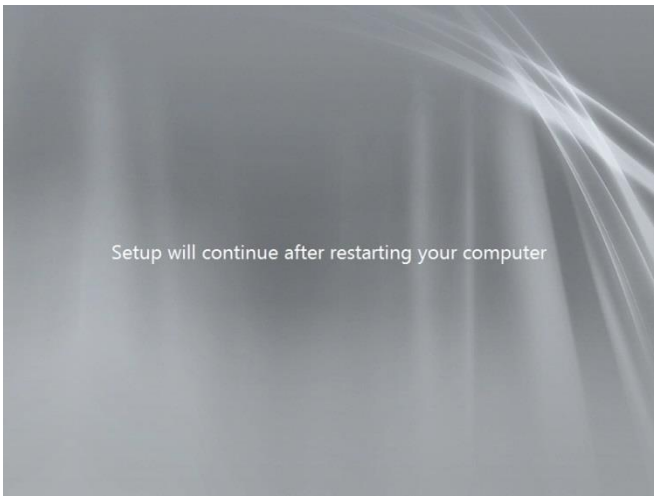
i. Create the partitions as appropriate. Then click on the partition that you want to install the Operating System on and click *Next*



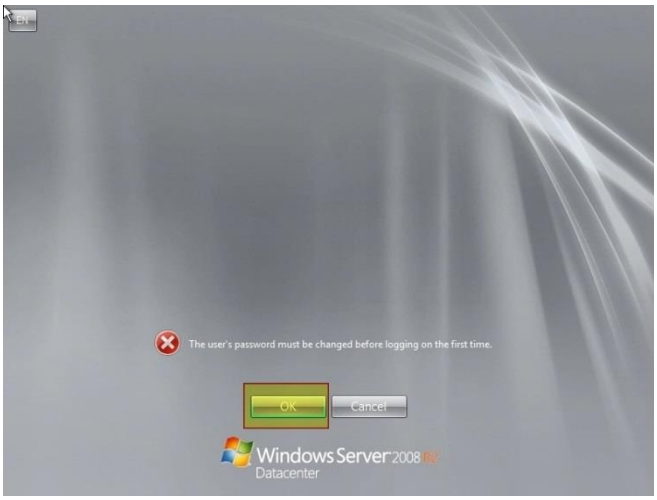
j. Windows begins the installation



k. A number of screens are iterated through

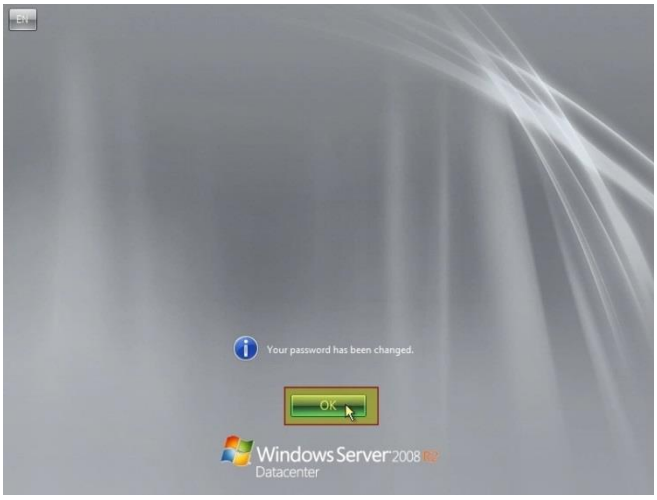


l. You are then prompted to change your password. Click *OK*



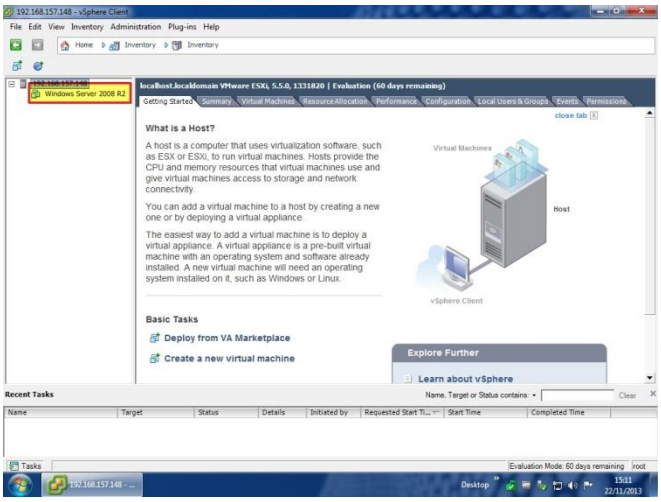
m. Enter an appropriate password and press *Enter*

n. Windows confirms that your password has been changed. When you press *OK*, the *Windows Server 2008 R2* home screen opens

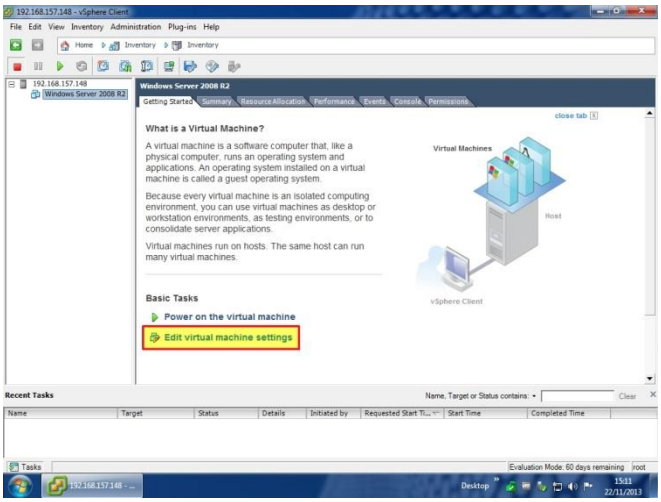


4. Change the ISO to *vCenter Server*

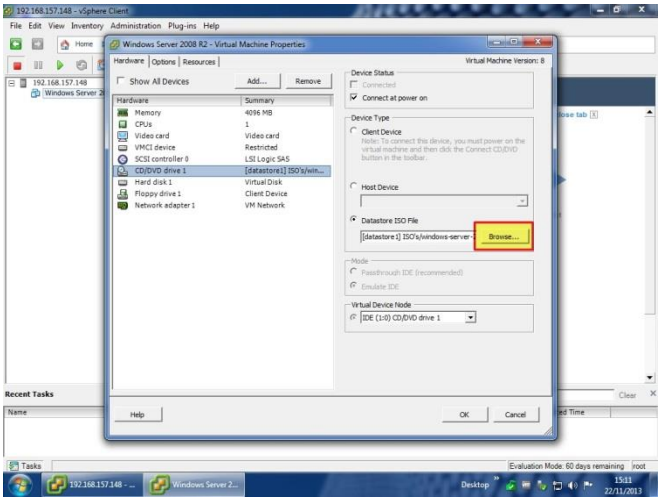
a. Click on the virtual machine that you want to install *vCenter Server* on



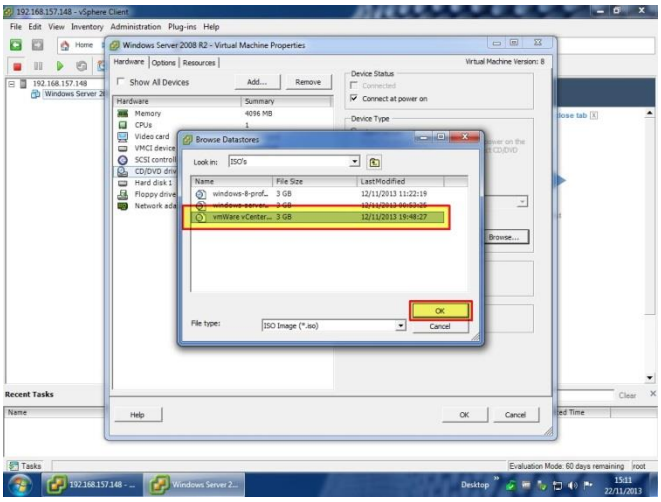
b. Click *Edit virtual machine settings*



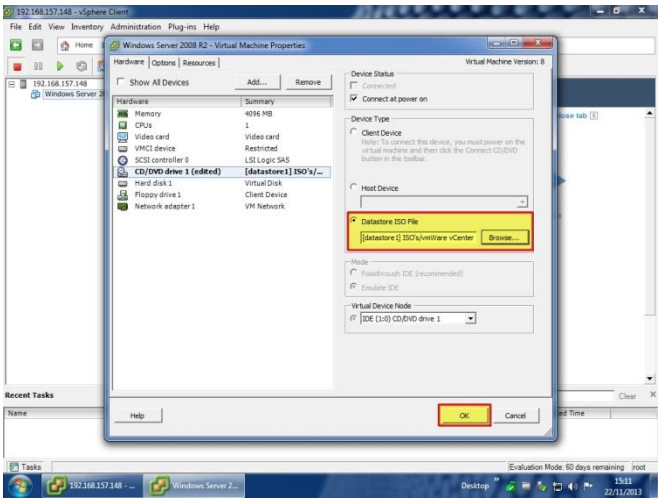
c. Click on *CD/DVD drive I*. On the right, click *Datastore ISO File*, then click *Browse…*



d. Browse to the appropriate ISO and click *OK*

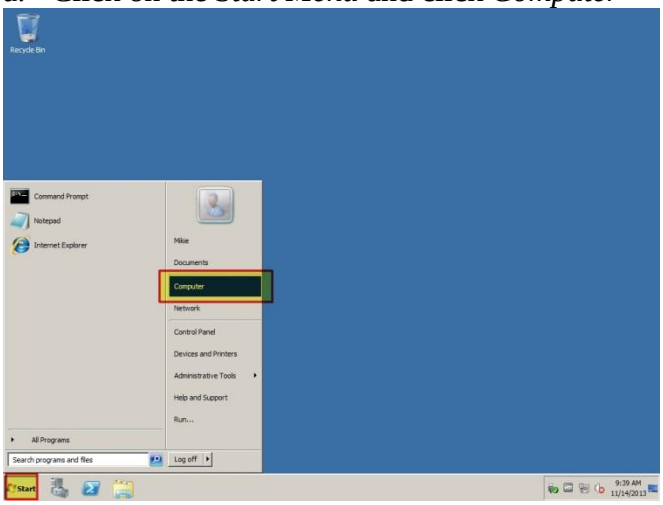


e. Make sure that the appropriate ISO file has been selected and click *OK*

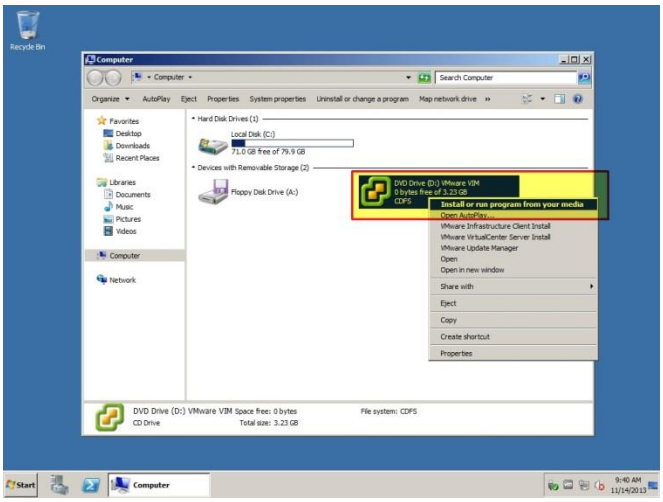


5. Install *vCenter Single Sign-On*

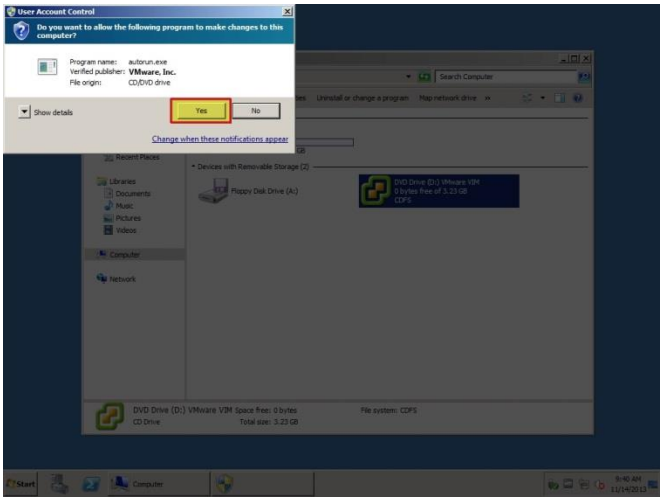
a. Click on the *Start Menu* and click *Computer*



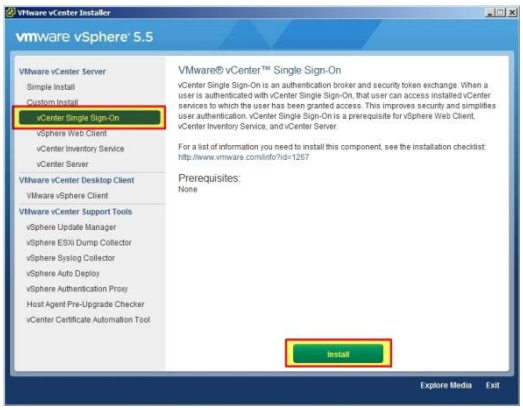
b. Right click on the disk drive and click *Install or run program from your media*



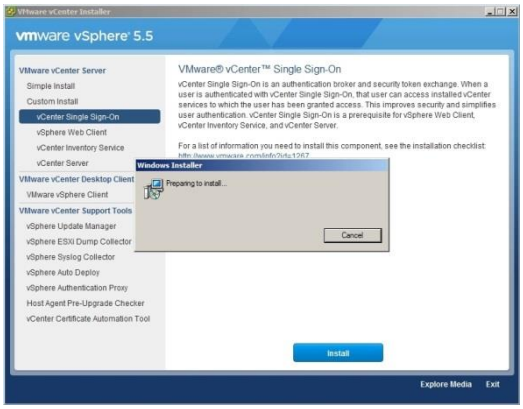
c. Click *Yes* when asked if you want this program to make changes to this computer



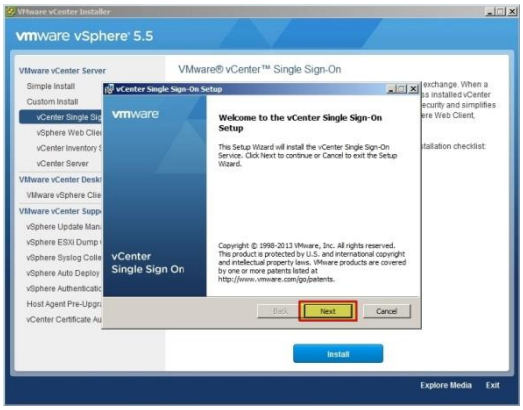
d. Click *vCenter Single Sign-On* and click *Install*


VMware vCenter Installer
vmware vSphere 5.5
VMware vCenter Server
Simple Install
Custom Install
vCenter Single Sign-On
vSphere Web Client
vCenter Inventory Service
vCenter Server
VMware vCenter Desktop Client
VMware vSphere Client
VMware vCenter Support Tools
vSphere Update Manager
vSphere ESXi Dump Collector
vSphere Syslog Collector
vSphere Auto Deploy
vSphere Authentication Proxy
Host Agent Pre-Upgrade Checker
vCenter Certificate Automation Tool
VMware® vCenter™ Single Sign-On
vCenter Single Sign-On is an authentication broker and security token exchange. When a user is authenticated with vCenter Single Sign-On, that user can access installed vCenter services to which the user has been granted access. This improves security and simplifies user authentication. vCenter Single Sign-On is a prerequisite for vSphere Web Client, vCenter Inventory Service, and vCenter Server.
For a list of information you need to install this component, see the installation checklist: http://www.vmware.com/info?id=1267
Prerequisites:
None
Install
Explore Media
Exit

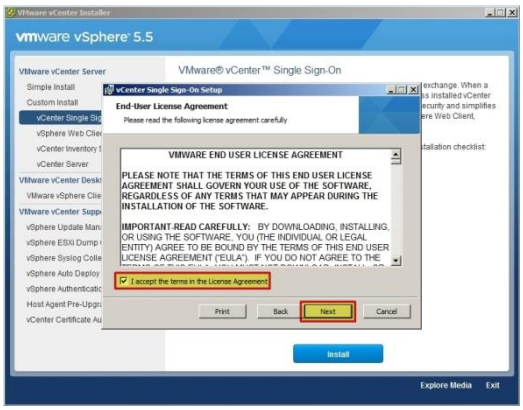
e. Windows Installer starts



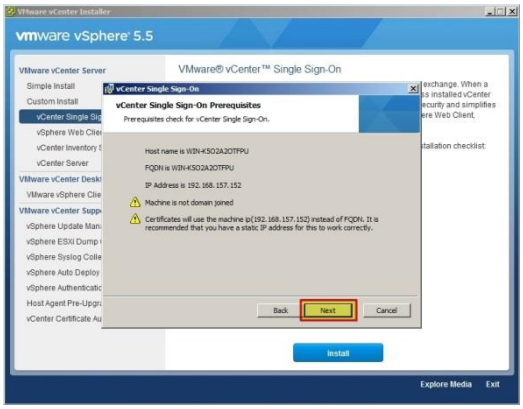
f. The welcome screen opens. Click *Next*


VMware vCenter Installer
vmware vSphere 5.5
VMware® vCenter™ Single Sign-On
vCenter Single Sign-On Setup
vmware
Welcome to the vCenter Single Sign-On Setup
This Setup Wizard will install the vCenter Single Sign-On Service. Click Next to continue or Cancel to exit the Setup Wizard.
Copyright © 1998-2013 VMware, Inc. All rights reserved.
This product is protected by U.S. and international copyright and intellectual property laws. VMware products are covered by one or more patents listed at http://www.vmware.com/go/patents.
vCenter Single Sign On
Back
Next
Cancel
Install
Explore Media
Exit

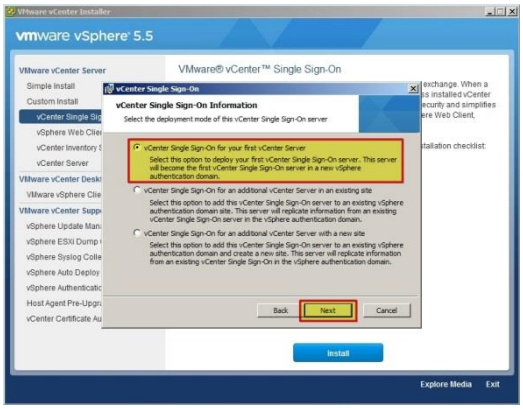
g. Click *I accept the terms of the Licence Agreement* and click *Next*


vmware vSphere 5.5
VMware® vCenter™ Single Sign-On
vCenter Single Sign-On Setup
End-User License Agreement
Please read the following license agreement carefully
VMWARE END USER LICENSE AGREEMENT
PLEASE NOTE THAT THE TERMS OF THIS END USER LICENSE AGREEMENT SHALL GOVERN YOUR USE OF THE SOFTWARE, REGARDLESS OF ANY TERMS THAT MAY APPEAR DURING THE INSTALLATION OF THE SOFTWARE.
IMPORTANT-READ CAREFULLY: BY DOWNLOADING, INSTALLING, OR USING THE SOFTWARE, YOU (THE INDIVIDUAL OR LEGAL ENTITY) AGREE TO BE BOUND BY THE TERMS OF THIS END USER LICENSE AGREEMENT ("EULA"). IF YOU DO NOT AGREE TO THE
I accept the terms in the License Agreement
Print
Back
Next
Cancel
Install
Explore Media
Exit

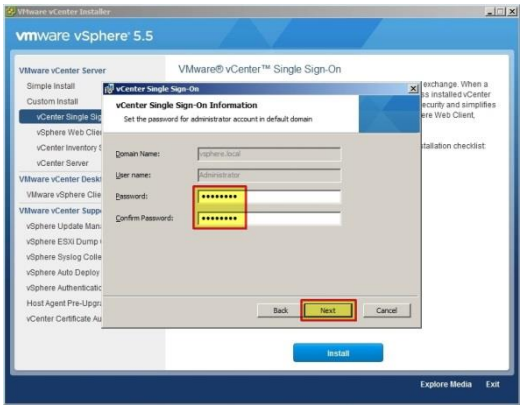
h. A number of warnings appear. Note that it is not required to be part of a domain to use *vCenter Single Sign-On*


vmware vSphere 5.5
VMware® vCenter™ Single Sign-On
vCenter Single Sign-On
vCenter Single Sign-On Prerequisites
Prerequisites check for vCenter Single Sign-On.
Host name is WIN-KSO2A2OTFPU
FQDN is WIN-KSO2A2OTFPU
IP Address is 192.168.157.152
Machine is not domain joined
Certificates will use the machine ip(192.168.157.152) instead of FQDN. It is recommended that you have a static IP address for this to work correctly.
Back
Next
Cancel
Install
Explore Media
Exit

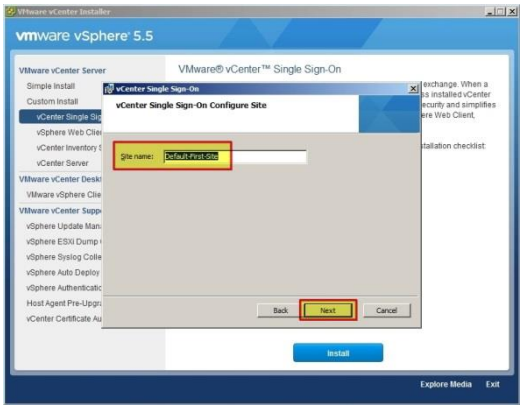
i. Click *vCenter Single Sign-On for you first vCenter* Server and then click *Next*


vmware vSphere 5.5
VMware® vCenter™ Single Sign-On
vCenter Single Sign-On
vCenter Single Sign-On Information
Select the deployment mode of this vCenter Single Sign-On server
vCenter Single Sign-On for your first vCenter Server
Select this option to deploy your first vCenter Single Sign-On server. This server will become the first vCenter Single Sign-On server in a new vSphere authentication domain.
vCenter Single Sign-On for an additional vCenter Server in an existing site
Select this option to add this vCenter Single Sign-On server to an existing vSphere authentication domain site. This server will replicate information from an existing vCenter Single Sign-On server in the vSphere authentication domain.
vCenter Single Sign-On for an additional vCenter Server with a new site
Select this option to add this vCenter Single Sign-On server to an existing vSphere authentication domain and create a new site. This server will replicate information from an existing vCenter Single Sign-On in the vSphere authentication domain.
Back
Next
Cancel
Install
Explore Media
Exit

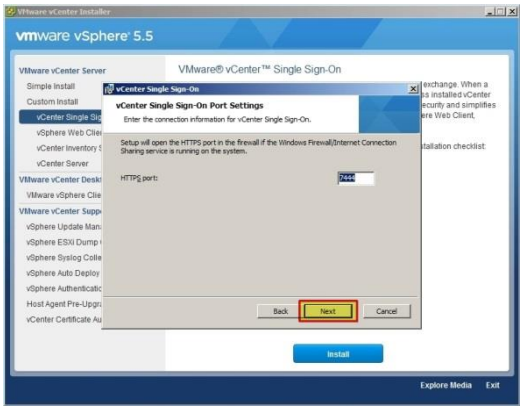
j. Enter an appropriate password and click *Next*



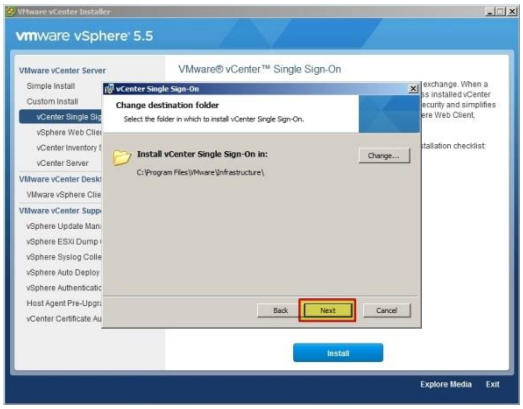
k. Enter an appropriate Site name and click *Next*



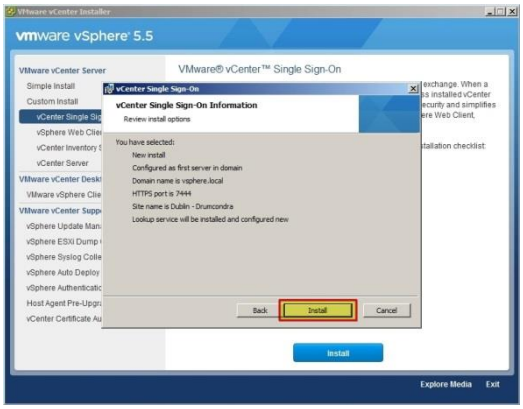
l. If you want to configure the HTTPs port, modify it here and click *Next*



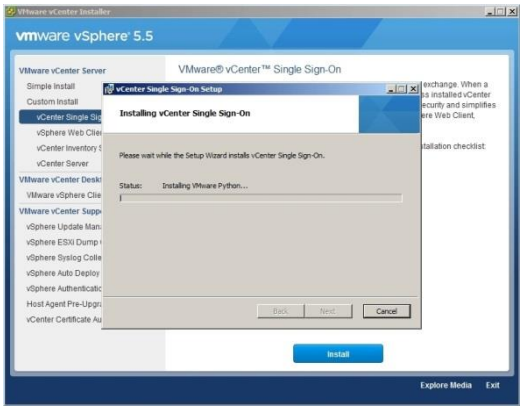
m. Select the appropriate installation folder and click *Next*



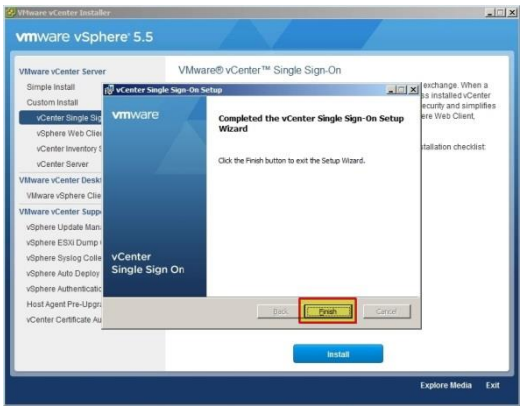
n. Confirm the configurations and click *Install*



o. *vCenter Single Sign-On* then installs

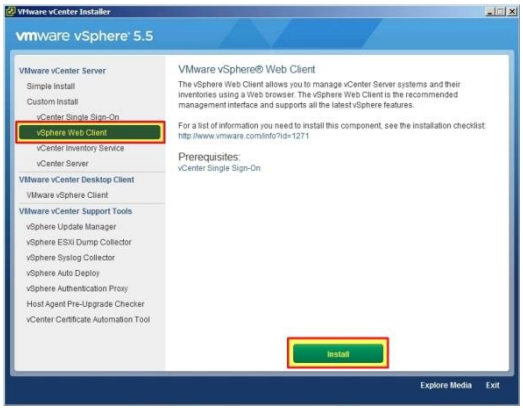


p. A screen appears on successful completion. Click *Finish*

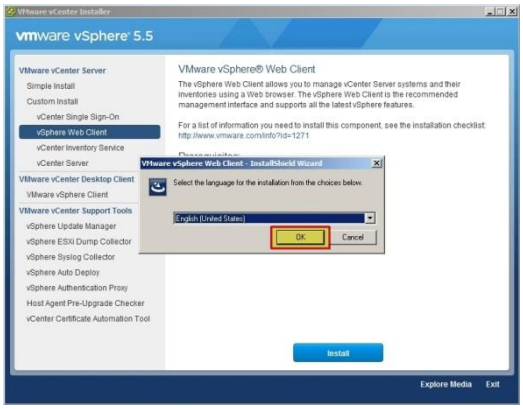


6. Install *vSphere Web Client*

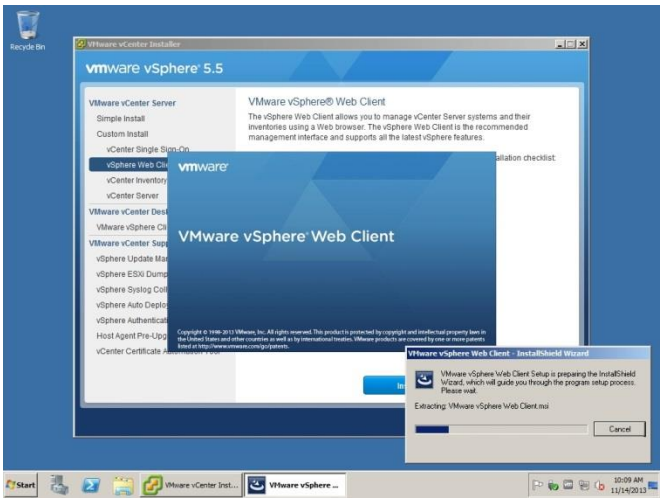
a. Click *vSphere Web Client* and then click Install


vmware vSphere 5.5
VMware vCenter Server
Simple Install
Custom Install
vCenter Single Sign-On
vSphere Web Client
vCenter Inventory Service
vCenter Server
VMware vCenter Desktop Client
VMware vSphere Client
VMware vCenter Support Tools
vSphere Update Manager
vSphere ESXi Dump Collector
vSphere Syslog Collector
vSphere Auto Deploy
vSphere Authentication Proxy
Host Agent Pre-Upgrade Checker
vCenter Certificate Automation Tool
VMware vSphere® Web Client
The vSphere Web Client allows you to manage vCenter Server systems and their inventories using a Web browser. The vSphere Web Client is the recommended management interface and supports all the latest vSphere features.
For a list of information you need to install this component, see the installation checklist: http://www.vmware.com/info?id=1271
Prerequisites:
vCenter Single Sign-On
Install
Explore Media
Exit

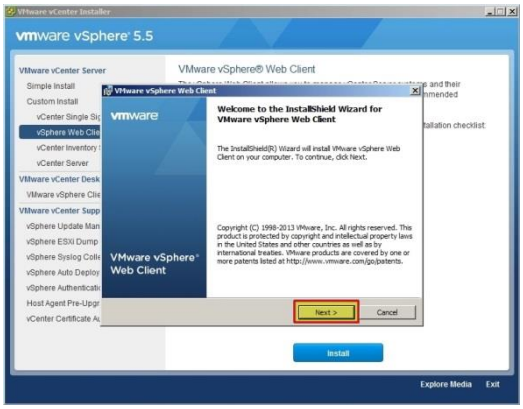
b. Select the appropriate language and click *OK*



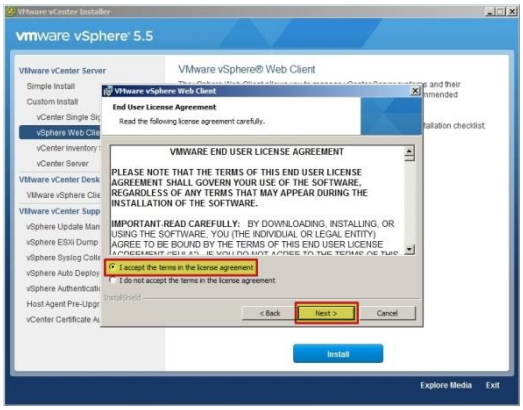
c. The installer then loads



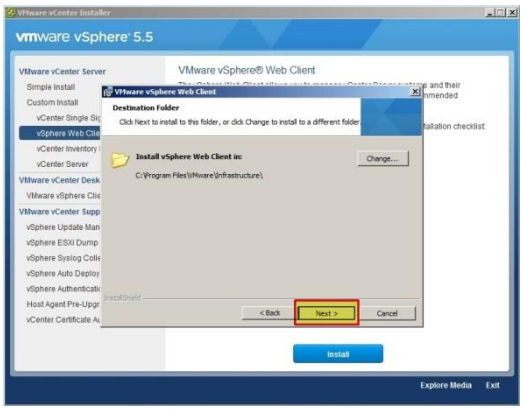
d. A welcome screen appears. Click *Next >*



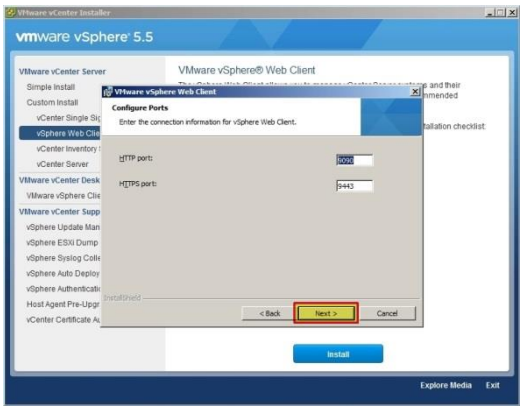
e. Click *I accept the terms in the licence agreement* and then click *Next >*



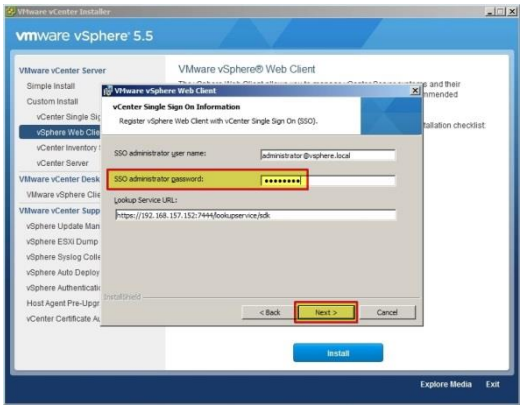
f. Confirm the installation folder and click *Next* >



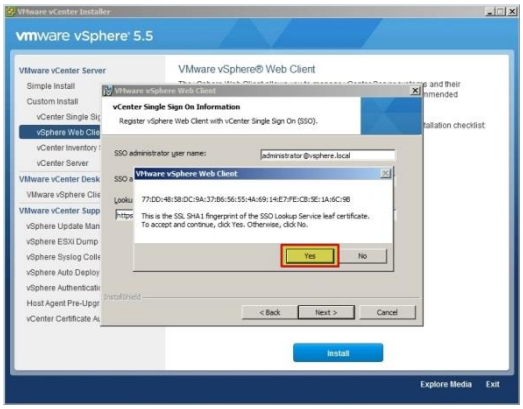
g. If you want to configure the ports used, change them here, and then click *Next* >



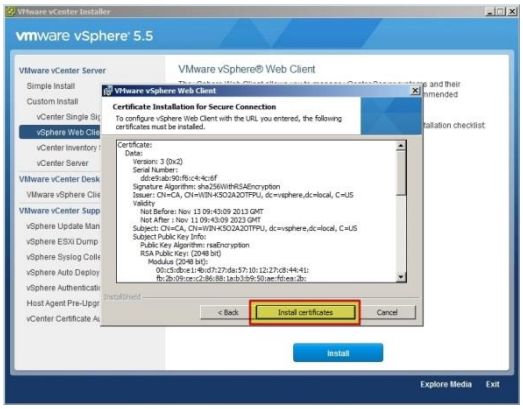
h. Enter an appropriate password and *Next* >



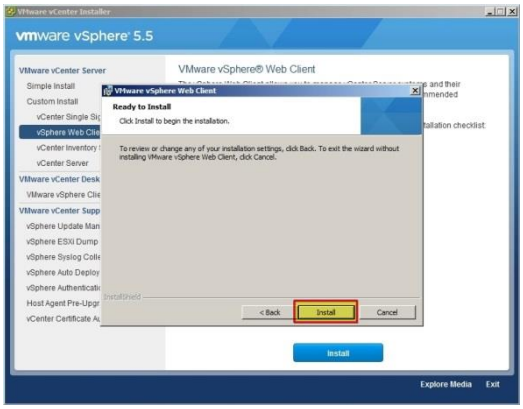
i. Click *Yes* to accept the SSL SHA1 fingerprint of the SSO Lookup Service leaf certificate


vmware vSphere 5.5
VMware vSphere® Web Client
vCenter Single Sign On Information
Register vSphere Web Client with vCenter Single Sign On (SSO).
SSO administrator user name:
administrator@vsphere.local
VMware vSphere Web Client
This is the SSL SHA1 fingerprint of the SSO Lookup Service leaf certificate.
To accept and continue, click Yes. Otherwise, click No.
Yes
No
< Back
Next >
Cancel
Install
Explore Media
Exit

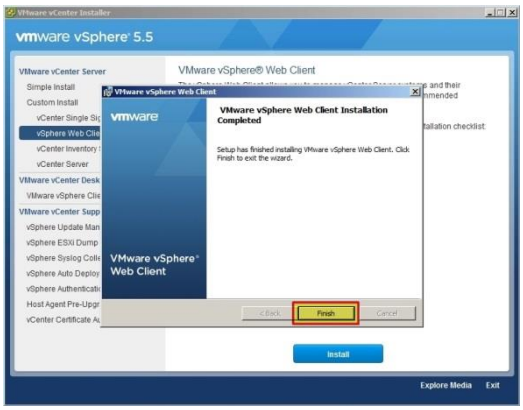
j. Install the necessary certificates by clicking *Install certificates*



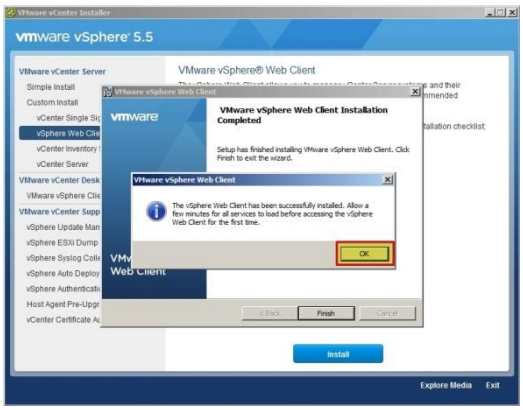
k. To proceed with the *vSphere Web Client* installation, click *Install*


vmware vSphere 5.5
VMware vSphere® Web Client
Ready to Install
Click Install to begin the installation.
To review or change any of your installation settings, click Back. To exit the wizard without installing VMware vSphere Web Client, click Cancel.
< Back
Install
Cancel
Install
Explore Media
Exit

l. When the installation completes, click *Finish*

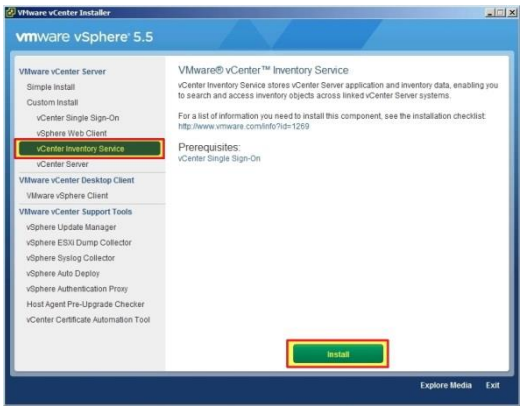


m. When you click Finish, a dialogue box appears notifying you that it will take some time for the services to start before you can use *vSphere Web Client*

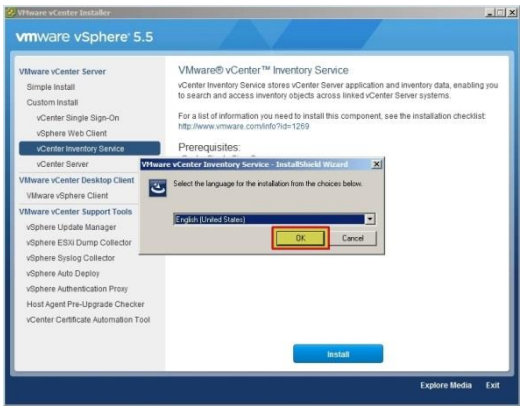

vmware vSphere 5.5
VMware vSphere® Web Client
VMware vSphere Web Client Installation Completed
Setup has finished installing VMware vSphere Web Client. Click Finish to exit the wizard.
The vSphere Web Client has been successfully installed. Allow a few minutes for all services to load before accessing the vSphere Web Client for the first time.
OK
Finish
Install
Explore Media
Exit

7. Install *vCenter Inventory Service*

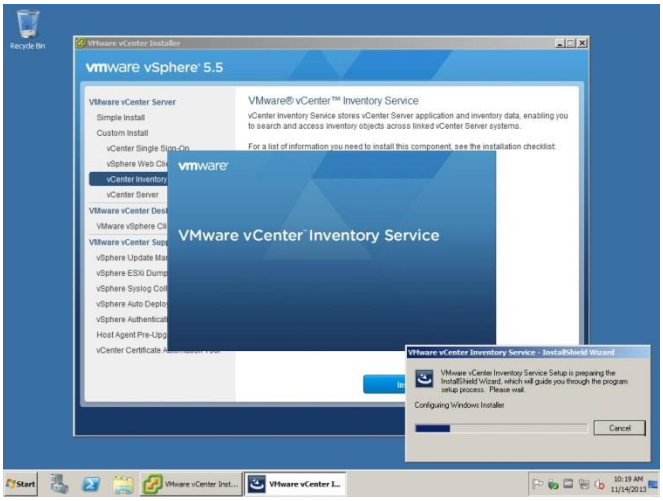
a. Click *vCenter Inventory Service* and then click *Install*


vmware vSphere 5.5
VMware vCenter Server
Simple Install
Custom Install
vCenter Single Sign-On
vSphere Web Client
vCenter Inventory Service
vCenter Server
VMware vCenter Desktop Client
VMware vSphere Client
VMware vCenter Support Tools
vSphere Update Manager
vSphere ESXi Dump Collector
vSphere Syslog Collector
vSphere Auto Deploy
vSphere Authentication Proxy
Host Agent Pre-Upgrade Checker
vCenter Certificate Automation Tool
VMware® vCenter™ Inventory Service
vCenter Inventory Service stores vCenter Server application and inventory data, enabling you to search and access inventory objects across linked vCenter Server systems.
For a list of information you need to install this component, see the installation checklist:
http://www.vmware.com/info?id=1269
Prerequisites:
vCenter Single Sign-On
Install
Explore Media
Exit

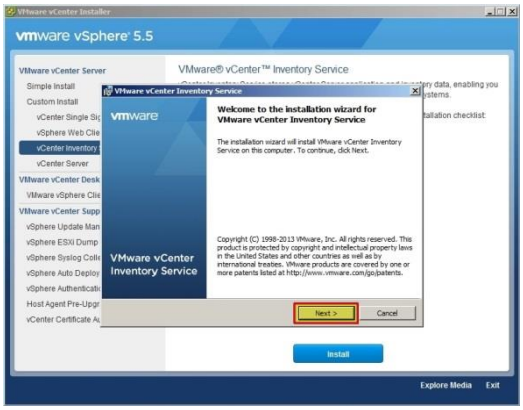
b. Select the appropriate language and click *OK*



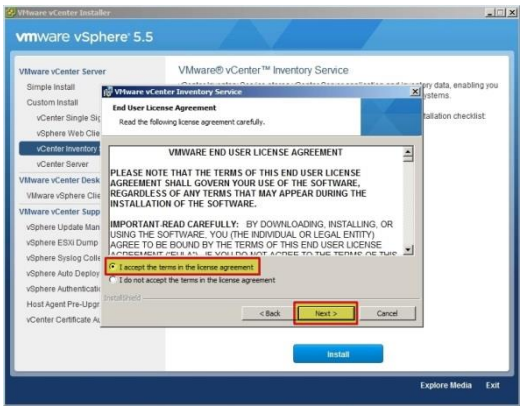
c. The installer then loads



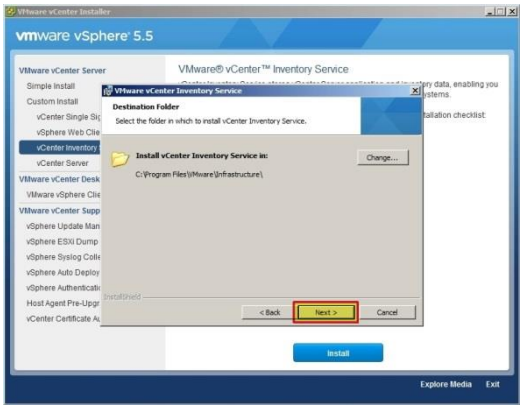
d. A welcome screen appears. Click *Next >*


vmware vSphere 5.5
VMware® vCenter™ Inventory Service
Welcome to the installation wizard for VMware vCenter Inventory Service
The installation wizard will install VMware vCenter Inventory Service on this computer. To continue, click Next.
VMware vCenter Inventory Service
Next >
Cancel
Install
Explore Media
Exit

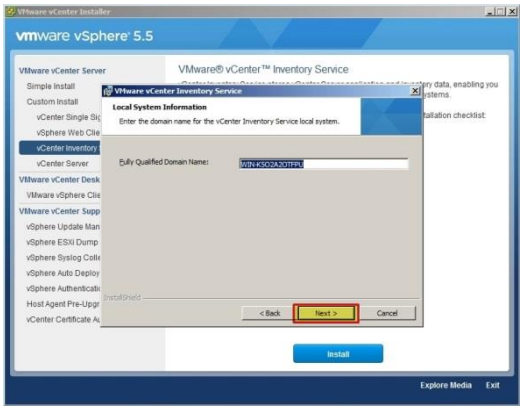
e. Click *I accept the terms of the licence agreement* and click *Next >*


vmware vSphere 5.5
VMware® vCenter™ Inventory Service
VMware vCenter Inventory Service
End User License Agreement
Read the following license agreement carefully.
VMWARE END USER LICENSE AGREEMENT
PLEASE NOTE THAT THE TERMS OF THIS END USER LICENSE AGREEMENT SHALL GOVERN YOUR USE OF THE SOFTWARE, REGARDLESS OF ANY TERMS THAT MAY APPEAR DURING THE INSTALLATION OF THE SOFTWARE.
IMPORTANT-READ CAREFULLY: BY DOWNLOADING, INSTALLING, OR USING THE SOFTWARE, YOU (THE INDIVIDUAL OR LEGAL ENTITY) AGREE TO BE BOUND BY THE TERMS OF THIS END USER LICENSE
I accept the terms in the license agreement
I do not accept the terms in the license agreement
InstallShield
< Back
Next >
Cancel
Install
Explore Media
Exit

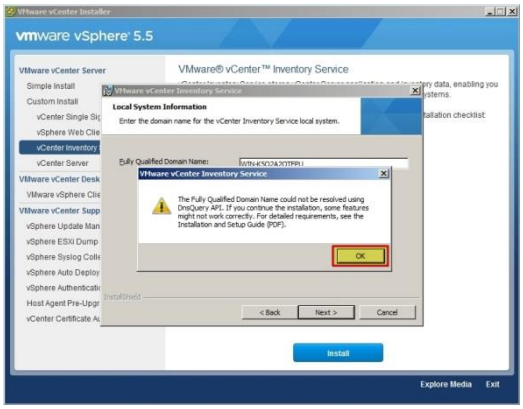
f. Select the appropriate installation folder and click *Next >*



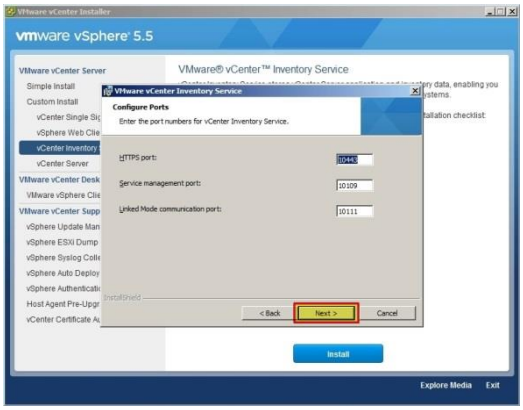
g. Enter the appropriate domain name, or leave it as default, and click *Next >*



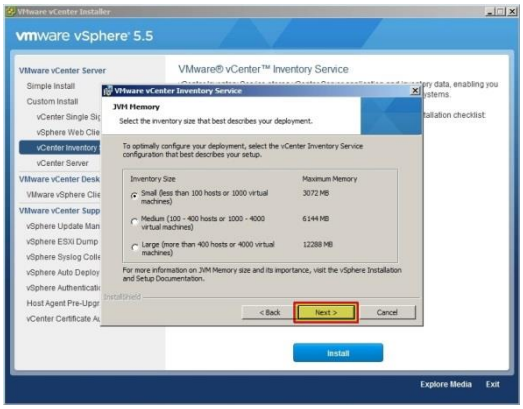
h. If you do not enter a suitable domain name, you will get a warning message. Click *OK*


vmware vSphere 5.5
VMware® vCenter™ Inventory Service
Local System Information
Enter the domain name for the vCenter Inventory Service local system.
Fully Qualified Domain Name:
VMware vCenter Inventory Service
The Fully Qualified Domain Name could not be resolved using DnsQuery API. If you continue the installation, some features might not work correctly. For detailed requirements, see the Installation and Setup Guide (PDF).
OK
< Back
Next >
Cancel
Install
Explore Media
Exit

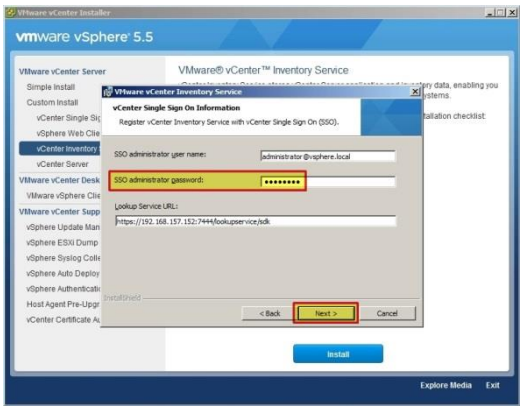
i. If you need to configure the ports that are used by *vCenter Inventory Service*, change them here and then *click Next >*



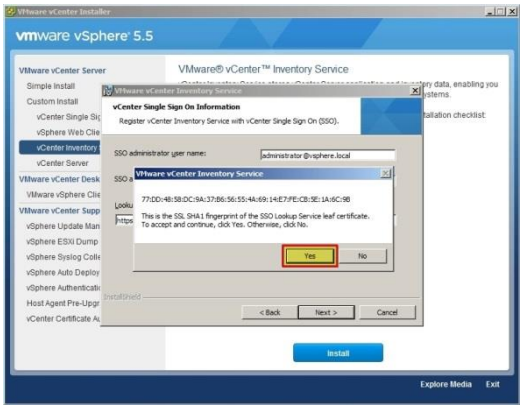
j. Select *Small (less than 100 hosts or 1000 virtual machines)* as the Inventory Size and click *Next >*


vmware vSphere 5.5
VMware® vCenter™ Inventory Service
JVM Memory
Select the inventory size that best describes your deployment.
To optimally configure your deployment, select the vCenter Inventory Service configuration that best describes your setup.
Inventory Size
Maximum Memory
Small (less than 100 hosts or 1000 virtual machines)
3072 MB
Medium (100 - 400 hosts or 1000 - 4000 virtual machines)
6144 MB
Large (more than 400 hosts or 4000 virtual machines)
12288 MB
For more information on JVM Memory size and its importance, visit the vSphere Installation and Setup Documentation.
< Back
Next >
Cancel
Install
Explore Media
Exit

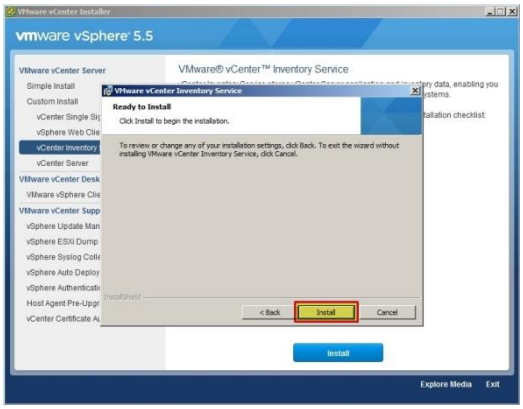
k. Enter the appropriate *SSO administrator password* and click *Next >*



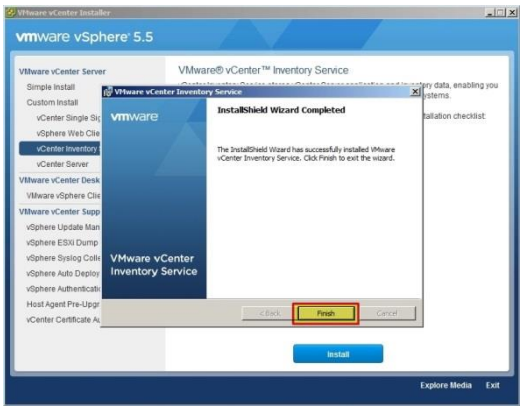
l. Click *Yes* to accept the SSL SHA1 fingerprint of the SSO Lookup Service leaf certificate



m. Click Install to begin the installation of *vCenter Inventory Service*

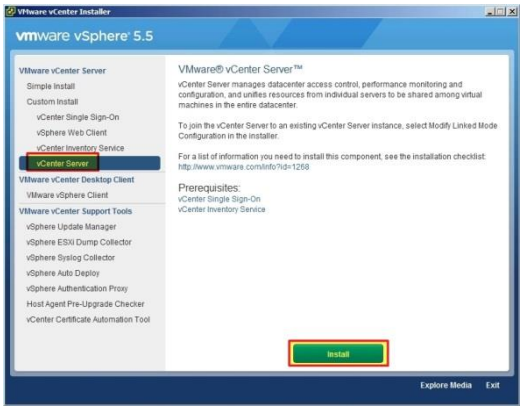

vmware vSphere 5.5
VMware® vCenter™ Inventory Service
Ready to Install
Click Install to begin the installation.
To review or change any of your installation settings, click Back. To exit the wizard without installing VMware vCenter Inventory Service, click Cancel.
< Back
Install
Cancel
Install
Explore Media
Exit

n. Once it completes successfully, click *Finish*

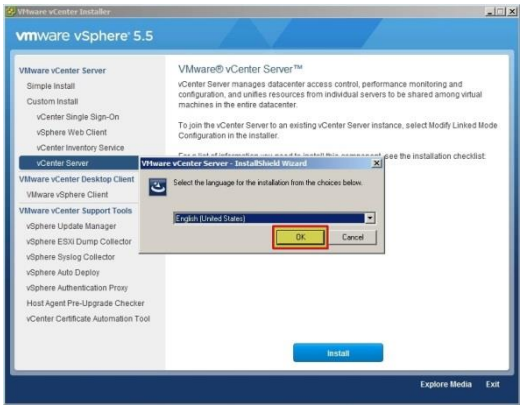


8. Install *vCenter Server*

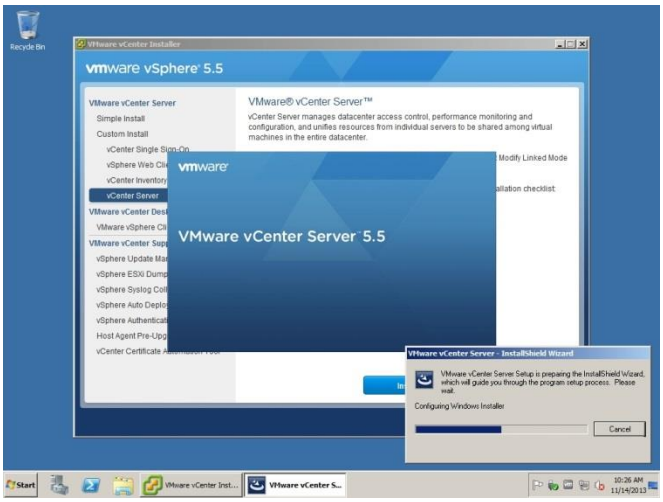
a. Click *vCenter Server* and then click *Install*


VMware vCenter Installer
vmware vSphere 5.5
VMware vCenter Server
Simple Install
Custom Install
vCenter Single Sign-On
vSphere Web Client
vCenter Inventory Service
vCenter Server
VMware vCenter Desktop Client
VMware vSphere Client
VMware vCenter Support Tools
vSphere Update Manager
vSphere ESXi Dump Collector
vSphere Syslog Collector
vSphere Auto Deploy
vSphere Authentication Proxy
Host Agent Pre-Upgrade Checker
vCenter Certificate Automation Tool
VMware® vCenter Server™
vCenter Server manages datacenter access control, performance monitoring and configuration, and unifies resources from individual servers to be shared among virtual machines in the entire datacenter.
To join the vCenter Server to an existing vCenter Server instance, select Modify Linked Mode Configuration in the installer.
For a list of information you need to install this component, see the installation checklist: http://www.vmware.com/info?id=1268
Prerequisites:
vCenter Single Sign-On
vCenter Inventory Service
Install
Explore Media
Exit

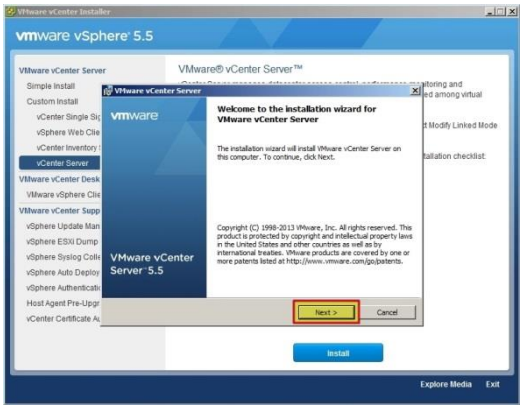
b. Select the appropriate language and click *OK*


VMware vCenter Installer
vmware vSphere 5.5
VMware vCenter Server
Simple Install
Custom Install
vCenter Single Sign-On
vSphere Web Client
vCenter Inventory Service
vCenter Server
VMware vCenter Desktop Client
VMware vSphere Client
VMware vCenter Support Tools
vSphere Update Manager
vSphere ESXi Dump Collector
vSphere Syslog Collector
vSphere Auto Deploy
vSphere Authentication Proxy
Host Agent Pre-Upgrade Checker
vCenter Certificate Automation Tool
VMware® vCenter Server™
vCenter Server manages datacenter access control, performance monitoring and configuration, and unifies resources from individual servers to be shared among virtual machines in the entire datacenter.
To join the vCenter Server to an existing vCenter Server instance, select Modify Linked Mode Configuration in the installer.
VMware vCenter Server - InstallShield Wizard
Select the language for the installation from the choices below.
English (United States)
OK
Cancel
Install
Explore Media
Exit

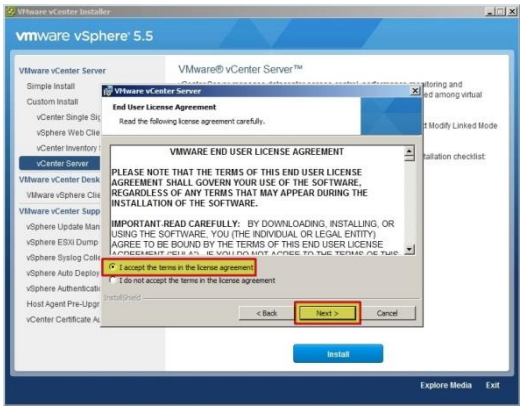
c. The installer then loads



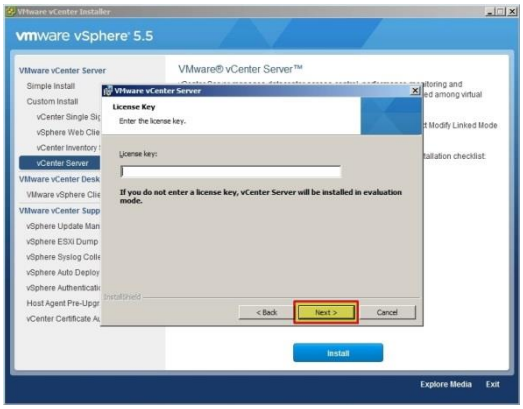
d. A welcome screen appears, click *Next >*


vmware vSphere 5.5
VMware vCenter Server
Welcome to the installation wizard for VMware vCenter Server
The installation wizard will install VMware vCenter Server on this computer. To continue, click Next.
Copyright (C) 1998-2013 VMware, Inc. All rights reserved.
VMware vCenter Server 5.5
Next >
Cancel
Install
Explore Media
Exit

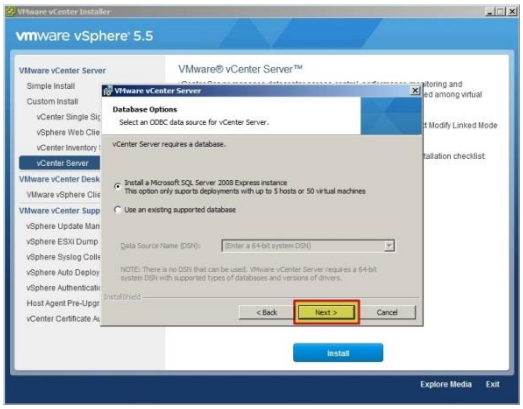
e. Click *I accept the terms in the licence agreement* and click *Next >*


vmware vSphere 5.5
VMware vCenter Server
End User License Agreement
Read the following license agreement carefully.
VMWARE END USER LICENSE AGREEMENT
PLEASE NOTE THAT THE TERMS OF THIS END USER LICENSE AGREEMENT SHALL GOVERN YOUR USE OF THE SOFTWARE, REGARDLESS OF ANY TERMS THAT MAY APPEAR DURING THE INSTALLATION OF THE SOFTWARE.
IMPORTANT-READ CAREFULLY: BY DOWNLOADING, INSTALLING, OR USING THE SOFTWARE, YOU (THE INDIVIDUAL OR LEGAL ENTITY) AGREE TO BE BOUND BY THE TERMS OF THIS END USER LICENSE
I accept the terms in the license agreement
I do not accept the terms in the license agreement
< Back
Next >
Cancel
Install
Explore Media
Exit

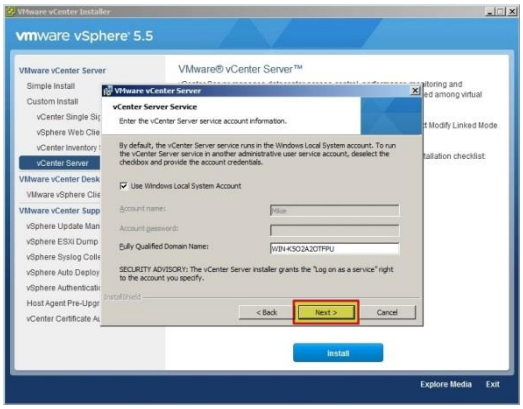
f. Enter a licence key if you have one, or leave it blank to use evaluation mode. Then click *Next >*



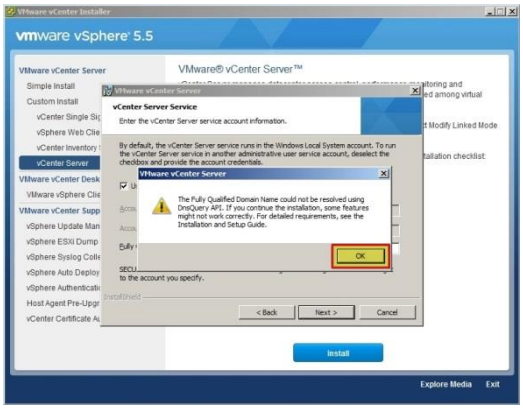
g. Click *Install a Microsoft SQL Server 2008 Express instance* and click *Next >*


vmware vSphere 5.5
VMware® vCenter Server™
Database Options
Select an ODBC data source for vCenter Server.
vCenter Server requires a database.
Install a Microsoft SQL Server 2008 Express instance
This option only supports deployments with up to 5 hosts or 50 virtual machines
Use an existing supported database
< Back
Next >
Cancel
Install
Explore Media
Exit

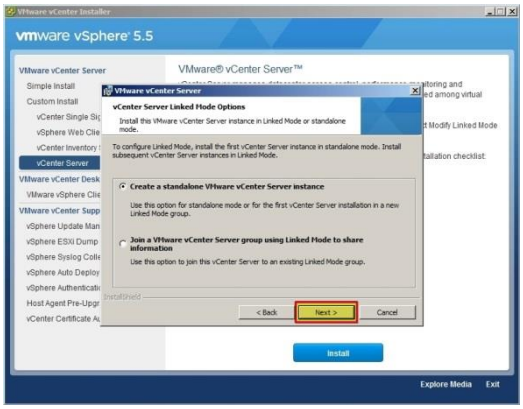
h. Make sure the *Use Windows Local System Account* it box checked and click *Next >*



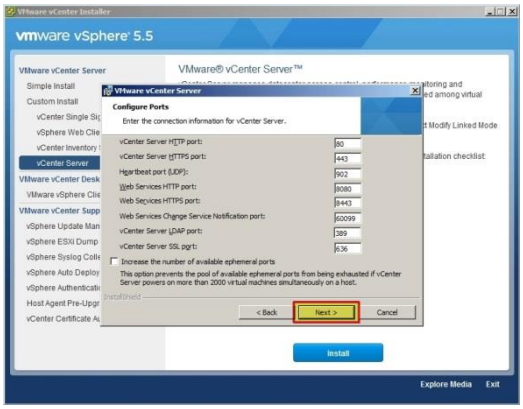
i. If you do not enter a suitable domain name, you will get a warning message. Click *OK*


vmware vSphere 5.5
VMware® vCenter Server™
vCenter Server Service
Enter the vCenter Server service account information.
The Fully Qualified Domain Name could not be resolved using DnsQuery API. If you continue the installation, some features might not work correctly. For detailed requirements, see the Installation and Setup Guide.
OK
< Back
Next >
Cancel
Install
Explore Media
Exit

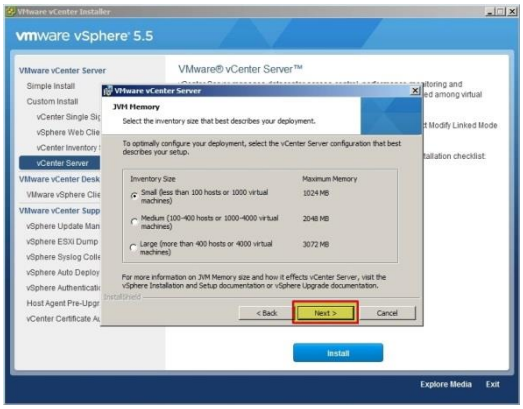
j. Select *Create a standalone VMware vCenter* instance and click *Next >*


vmware vSphere 5.5
VMware® vCenter Server™
vCenter Server Linked Mode Options
Install this VMware vCenter Server instance in Linked Mode or standalone mode.
To configure Linked Mode, install the first vCenter Server instance in standalone mode. Install subsequent vCenter Server instances in Linked Mode.
Create a standalone VMware vCenter Server instance
Use this option for standalone mode or for the first vCenter Server installation in a new Linked Mode group.
Join a VMware vCenter Server group using Linked Mode to share information
Use this option to join this vCenter Server to an existing Linked Mode group.
< Back
Next >
Cancel
Install
Explore Media
Exit

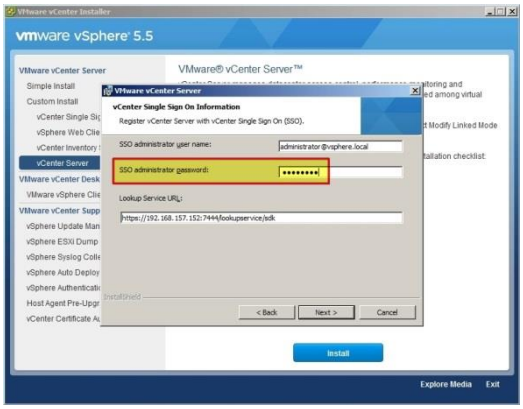
k. If you want to configure specific ports to be used, change them here. Then click *Next >*


vmware vSphere 5.5
VMware® vCenter Server™
Configure Ports
Enter the connection information for vCenter Server.
vCenter Server HTTP port:
vCenter Server HTTPS port:
Heartbeat port (UDP):
Web Services HTTP port:
Web Services HTTPS port:
Web Services Change Service Notification port:
vCenter Server LDAP port:
vCenter Server SSL port:
Increase the number of available ephemeral ports
This option prevents the pool of available ephemeral ports from being exhausted if vCenter Server powers on more than 2000 virtual machines simultaneously on a host.
< Back
Next >
Cancel
Install
Explore Media
Exit

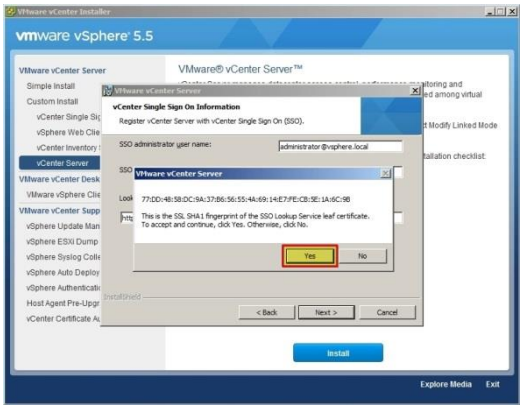
l. Select *Small (less than 100 hosts or 1000 virtual machines)* as the Inventory Size and click *Next >*



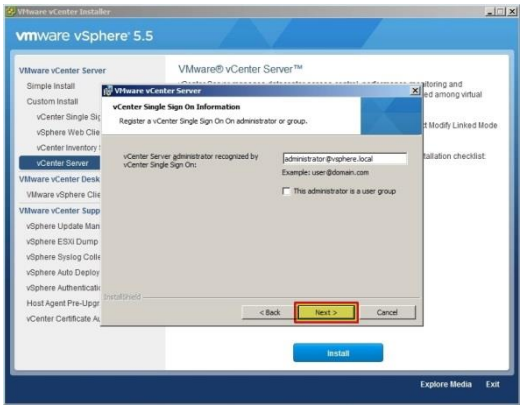
m. Enter the appropriate *SSO administrator password* and click *Next >*



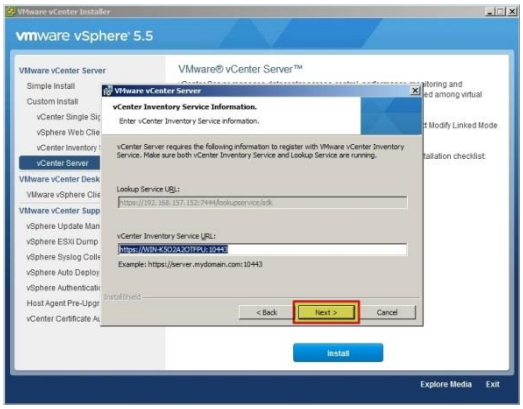
n. Click *Yes* to accept the SSL SHA1 fingerprint of the SSO Lookup Service leaf certificate



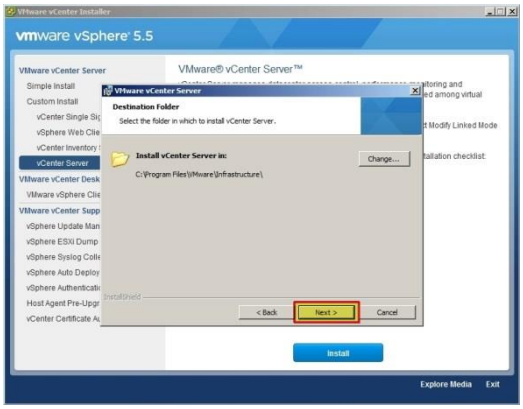
o. If you want to modify what the *vCenter Server* administrator is recognised by, change it here. Then click *Next* >



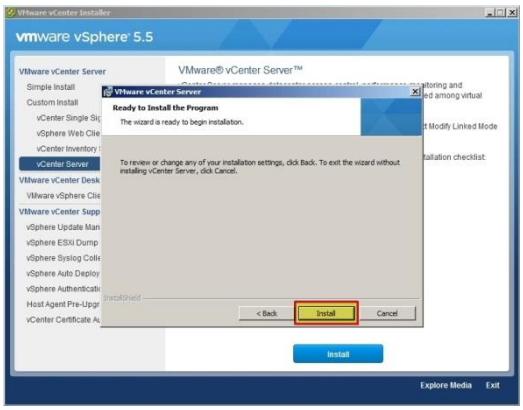
p. Enter the vCenter Inventory Service URL if necessary. Then click *Next* >


vmware vSphere 5.5
VMware® vCenter Server™
vCenter Inventory Service Information.
Enter vCenter Inventory Service information.
vCenter Server requires the following information to register with VMware vCenter Inventory Service. Make sure both vCenter Inventory Service and Lookup Service are running.
Lookup Service URL:
vCenter Inventory Service URL:
Example: https://server.mydomain.com:10443
< Back
Next >
Cancel
Install
Explore Media
Exit

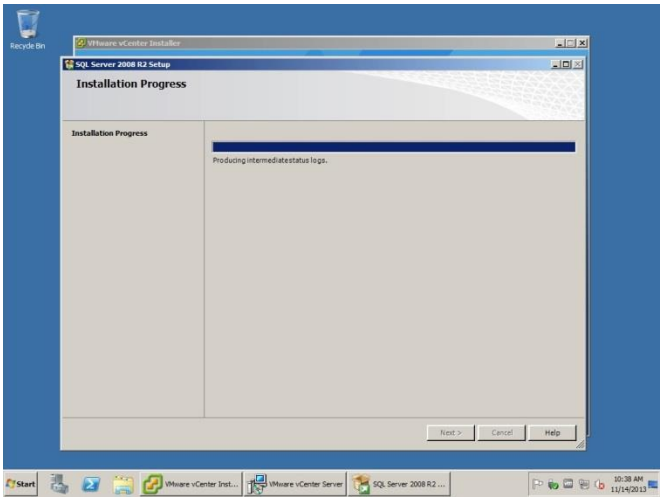
q. Select the installation folder, if necessary, and then click *Next* >



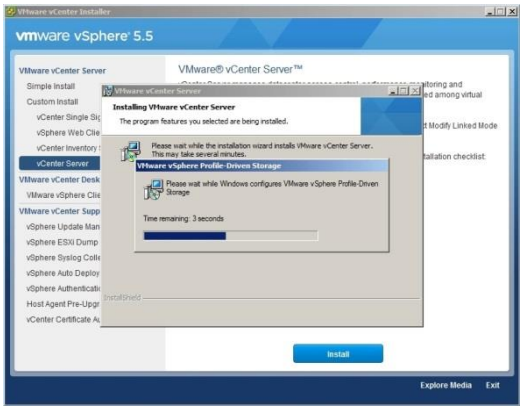
r. Click *Install* to proceed with the installation


vmware vSphere 5.5
VMware® vCenter Server™
Ready to Install the Program
The wizard is ready to begin installation.
To review or change any of your installation settings, click Back. To exit the wizard without installing vCenter Server, click Cancel.
< Back
Install
Cancel
Install
Explore Media
Exit

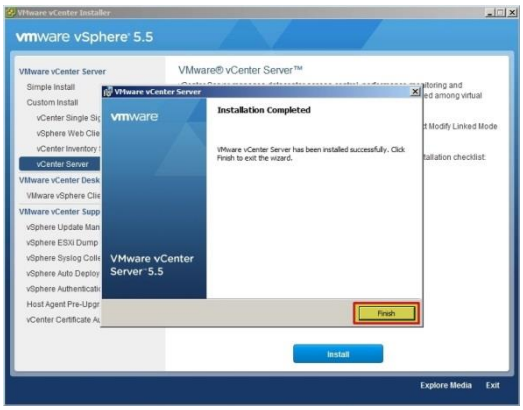
s. A *Microsoft SQL Server 2008 Express instance* is installed



t. *VMware vCenter Server* installation continues


vmware vSphere 5.5
VMware® vCenter Server™
Installing VMware vCenter Server
The program features you selected are being installed.
Please wait while the installation wizard installs VMware vCenter Server. This may take several minutes.
VMware vSphere Profile-Driven Storage
Please wait while Windows configures VMware vSphere Profile-Driven Storage
Time remaining: 3 seconds
Install
Explore Media
Exit

u. On successful completion, click *Finish*

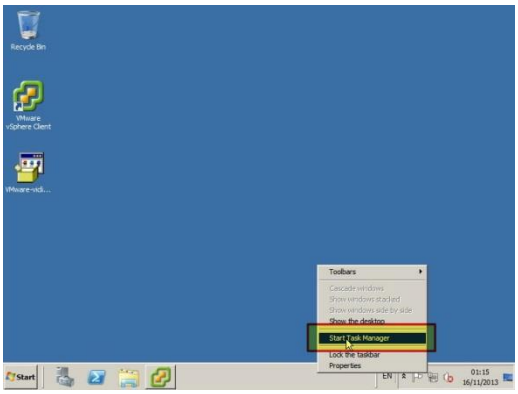


9. Install *vSphere Client* on this *Windows Server 2008 R2* machine

a. Please see task A.1.2 for details

10. Start all VMware services from the *Task Manager*

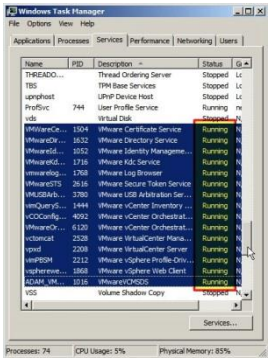
a. Right-click on the taskbar and click *Start Task Manager*



b. Open the *Services* tab and Order by *Description* by clicking on *Description*

Windows Task Manager
File Options View Help
Applications Processes Services Performance Networking Users
Name PID Description Status
Services...
Processes: 74 CPU Usage: 7% Physical Memory: 85%

c. Scroll down to *v*, and make sure that all VMware services are *Running*

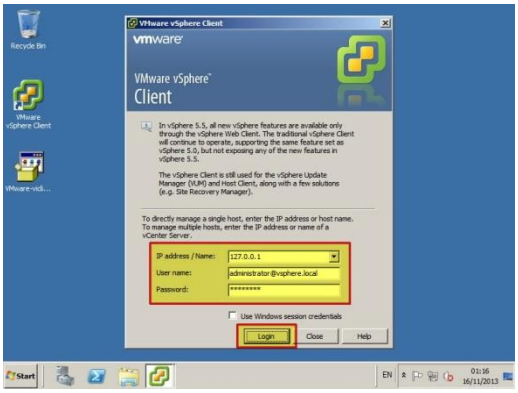


d. If not, right-click on them and click *Start Service*. It may take some time until it is in a Running state

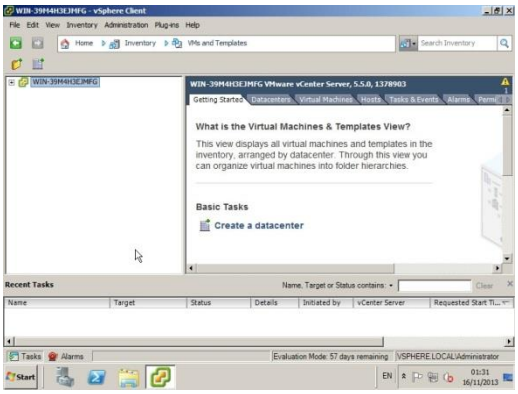
e. When they are all *Running*, complete the next task

11. Login to *vCenter Server*

a. Open *vSphere Client* and login using *127.0.0.1* (loopback address) as the IP address, *administrator@vsphere.local* as the username and the appropriate password



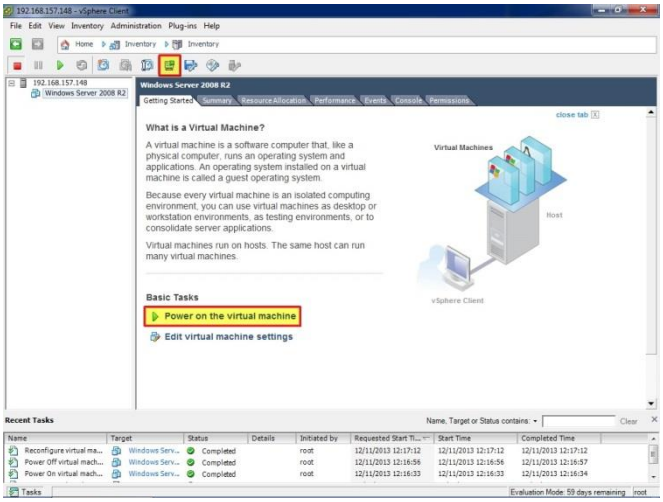
b. The home screen of *vCenter Server* will appear


What is the Virtual Machines & Templates View?
This view displays all virtual machines and templates in the inventory, arranged by datacenter. Through this view you can organize virtual machines into folder hierarchies.
Basic Tasks
Create a datacenter
Recent Tasks

12. Install *Microsoft Windows 7* Operating System

a. Create a new virtual machine, as in task A.2.2

b. Select the appropriate virtual machine within *vSphere Client* and click *Power on the virtual machine*

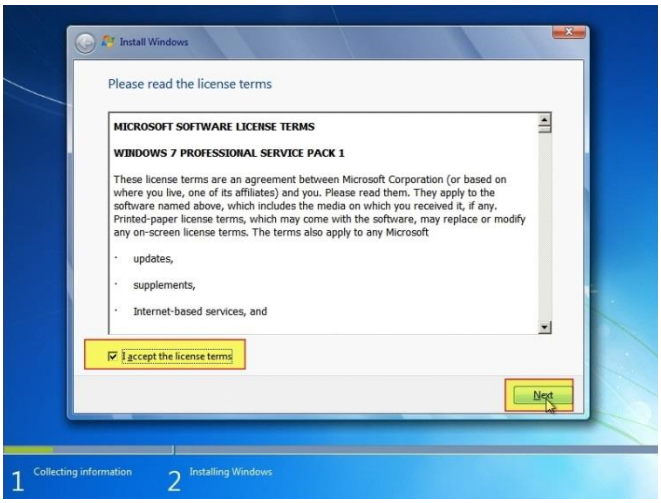

What is a Virtual Machine?
A virtual machine is a software computer that, like a physical computer, runs an operating system and applications. An operating system installed on a virtual machine is called a guest operating system.
Because every virtual machine is an isolated computing environment, you can use virtual machines as desktop or workstation environments, as testing environments, or to consolidate server applications.
Virtual machines run on hosts. The same host can run many virtual machines.
Basic Tasks
Power on the virtual machine
Edit virtual machine settings
Recent Tasks

c. Configure appropriately and click *Next*

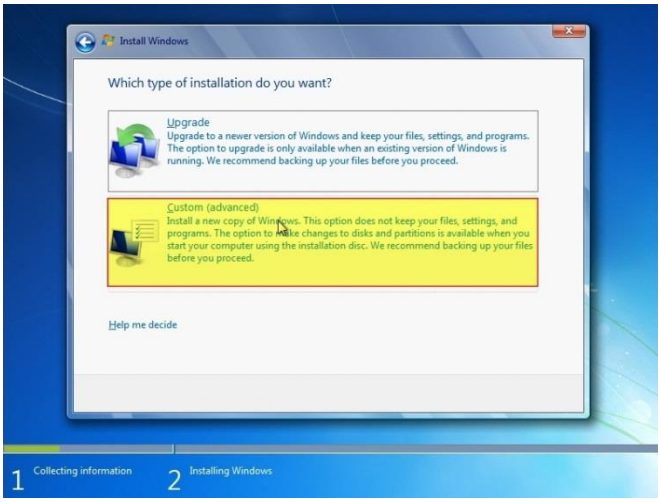
Install Windows
Windows 7
Language to install: English
Time and currency format: English (Ireland)
Keyboard or input method: Irish
Enter your language and other preferences and click "Next" to continue.
Copyright © 2009 Microsoft Corporation. All rights reserved.
Next

d. Click *Install now*

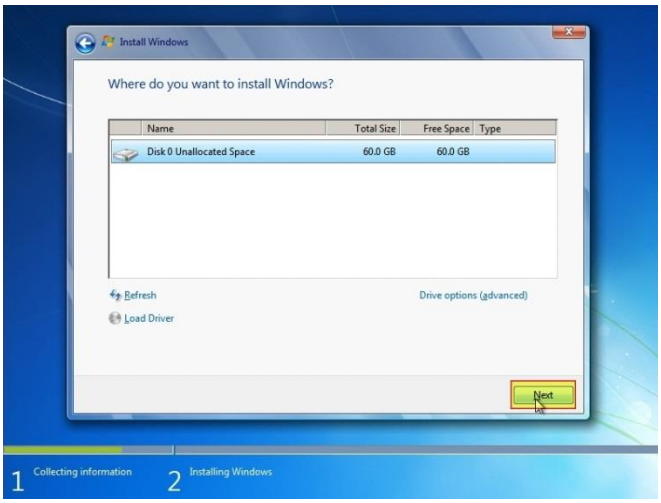
e. You must tick the box beside *I accept the licence terms*, and then *Next*


Install Windows
Please read the license terms
MICROSOFT SOFTWARE LICENSE TERMS
WINDOWS 7 PROFESSIONAL SERVICE PACK 1
These license terms are an agreement between Microsoft Corporation (or based on where you live, one of its affiliates) and you. Please read them. They apply to the software named above, which includes the media on which you received it, if any. Printed-paper license terms, which may come with the software, may replace or modify any on-screen license terms. The terms also apply to any Microsoft
updates,
supplements,
Internet-based services, and
I accept the license terms
Next
1 Collecting information
2 Installing Windows

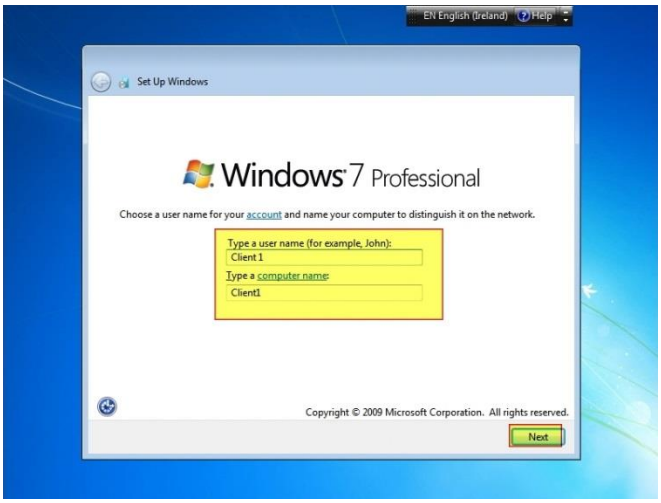
f. Select *Custom (advanced)* installation


Install Windows
Which type of installation do you want?
Upgrade
Upgrade to a newer version of Windows and keep your files, settings, and programs. The option to upgrade is only available when an existing version of Windows is running. We recommend backing up your files before you proceed.
Custom (advanced)
Install a new copy of Windows. This option does not keep your files, settings, and programs. The option to make changes to disks and partitions is available when you start your computer using the installation disc. We recommend backing up your files before you proceed.
Help me decide
1 Collecting information
2 Installing Windows

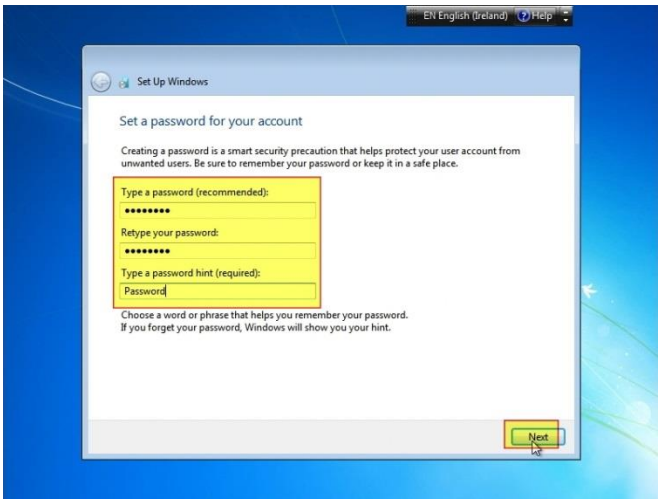
g. Select the drive that you want to install *Windows* on. Then click *Next*



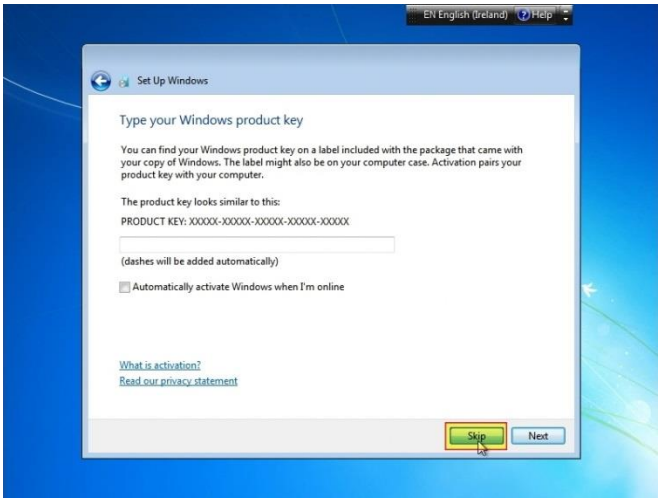
h. Name the computer and username appropriately and click *Next*


EN English (Ireland)
Help
Set Up Windows
Windows 7 Professional
Choose a user name for your account and name your computer to distinguish it on the network.
Type a user name (for example, John):
Client 1
Type a computer name:
Client1
Copyright © 2009 Microsoft Corporation. All rights reserved.
Next

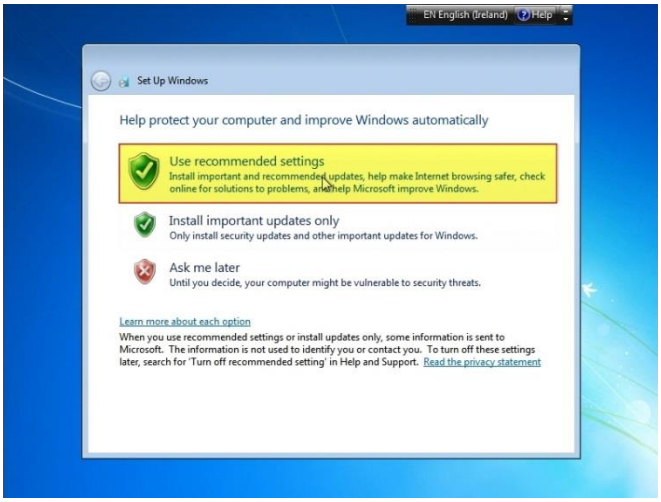
i. Enter the password to be associated with this account, as well as a password hint, and then *Next*


EN English (Ireland)
Help
Set Up Windows
Set a password for your account
Creating a password is a smart security precaution that helps protect your user account from unwanted users. Be sure to remember your password or keep it in a safe place.
Type a password (recommended):
Retype your password:
Type a password hint (required):
Password
Choose a word or phrase that helps you remember your password.
If you forget your password, Windows will show you your hint.
Next

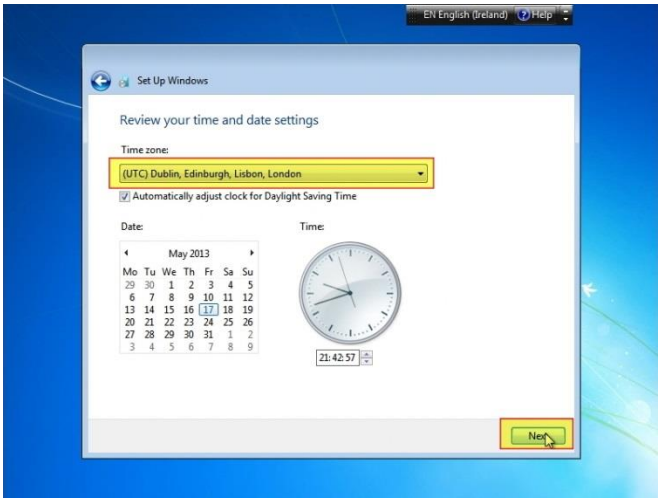
j. Enter the Windows licence key, or press *Skip* to enter it later or use the trial version


EN English (Ireland)
Help
Set Up Windows
Type your Windows product key
You can find your Windows product key on a label included with the package that came with your copy of Windows. The label might also be on your computer case. Activation pairs your product key with your computer.
The product key looks similar to this:
PRODUCT KEY: XXXXX-XXXXX-XXXXX-XXXXX-XXXXX
(dashes will be added automatically)
Automatically activate Windows when I'm online
What is activation?
Read our privacy statement
Skip
Next

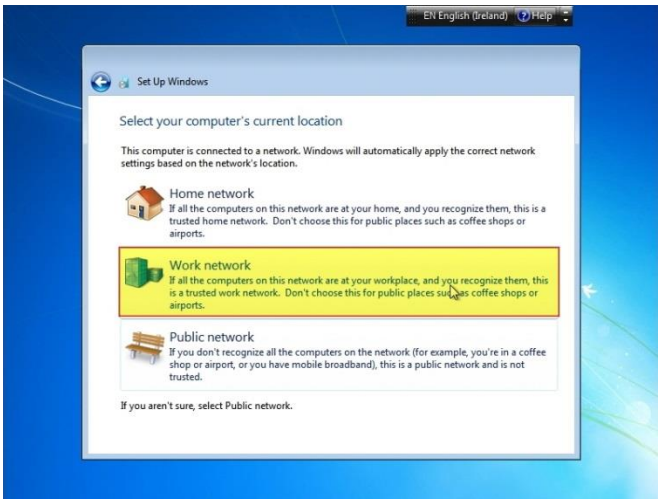
k. Click *Use recommended settings* so *Windows* updates are installed automatically


EN English (Ireland)
Help
Set Up Windows
Help protect your computer and improve Windows automatically
Use recommended settings
Install important and recommended updates, help make Internet browsing safer, check online for solutions to problems, and help Microsoft improve Windows.
Install important updates only
Only install security updates and other important updates for Windows.
Ask me later
Until you decide, your computer might be vulnerable to security threats.
Learn more about each option
When you use recommended settings or install updates only, some information is sent to Microsoft. The information is not used to identify you or contact you. To turn off these settings later, search for 'Turn off recommended setting' in Help and Support. Read the privacy statement

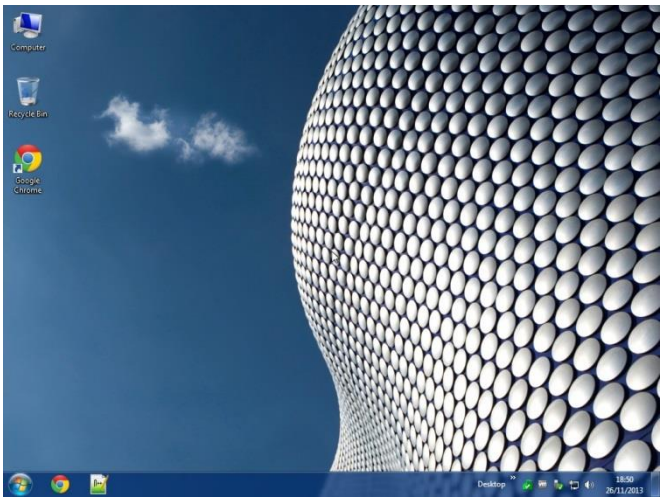
l. Select the appropriate time zone, then click *Next*


EN English (Ireland)
Help
Set Up Windows
Review your time and date settings
Time zone:
(UTC) Dublin, Edinburgh, Lisbon, London
Automatically adjust clock for Daylight Saving Time
Date:
Time:
May 2013
Mo Tu We Th Fr Sa Su
29 30 1 2 3 4 5
6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 31 1 2
3 4 5 6 7 8 9
21:42:57
Next

m. Click on the network type that you are joined to


EN English (Ireland)
Help
Set Up Windows
Select your computer's current location
This computer is connected to a network. Windows will automatically apply the correct network settings based on the network's location.
Home network
If all the computers on this network are at your home, and you recognize them, this is a trusted home network. Don't choose this for public places such as coffee shops or airports.
Work network
If all the computers on this network are at your workplace, and you recognize them, this is a trusted work network. Don't choose this for public places such as coffee shops or airports.
Public network
If you don't recognize all the computers on the network (for example, you're in a coffee shop or airport, or you have mobile broadband), this is a public network and is not trusted.
If you aren't sure, select Public network.

n. The *Windows* home screen then appears



o. Install *vSphere Client* as in Task A.1.2

Task A.3 - Creating a Typical Organisation Environment

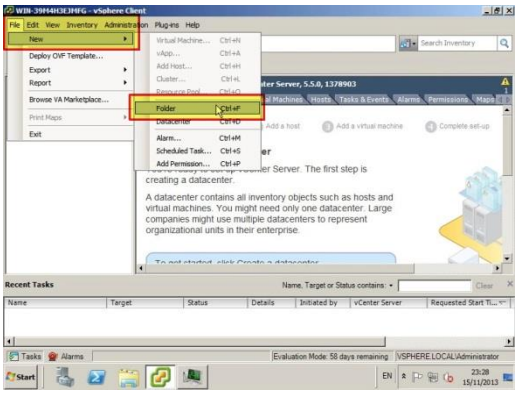
Task Overview

As your environment gets bigger, you will want to keep it organised so that it is not cluttered and difficult to administer, In order to keep your environment organised, you can create folders. You can use these folders to mimic a typical organisational environment. In the following task, datacenters will be added to these folders. Within each datacentre, hosts will then be added. Within *vCenter Server*, you can then easily manage your environment as all of your datacenters, hosts, clusters and virtual machines can easily be seen and recognised. This is essential for effective management as you need to know where everything is located.

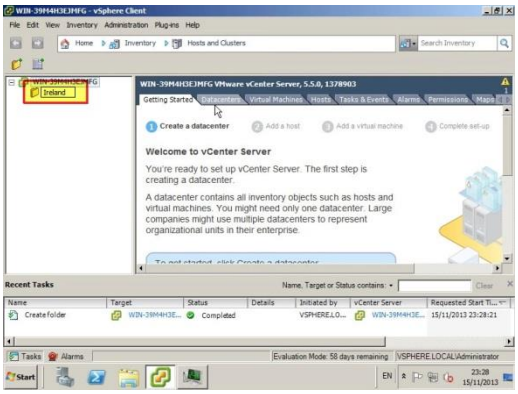
Task Guide

1. **Create Folders for the various locations where the organisation is based**

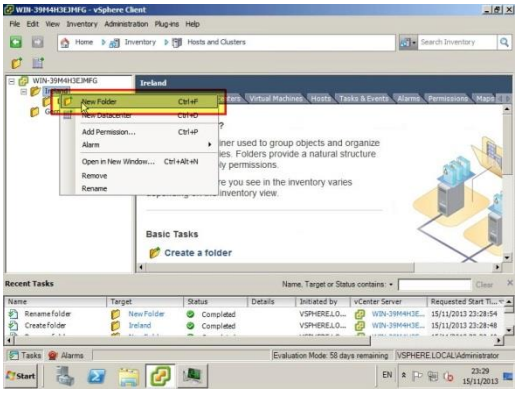
    a. Click *File* - *New* - *Folder*



    b. Name appropriately, either by location, or another suitable factor

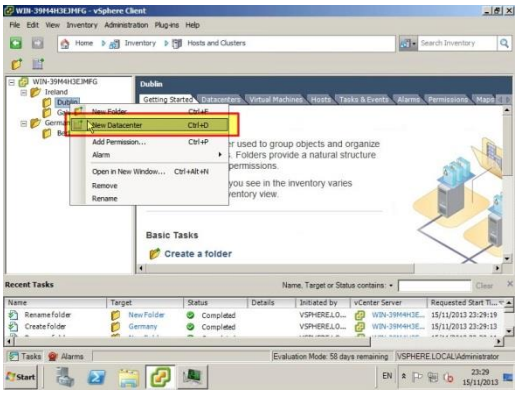


c. Create a folder within this folder, if necessary in order to organise the structure more suitably. Right click on the folder, and then click *New Folder*

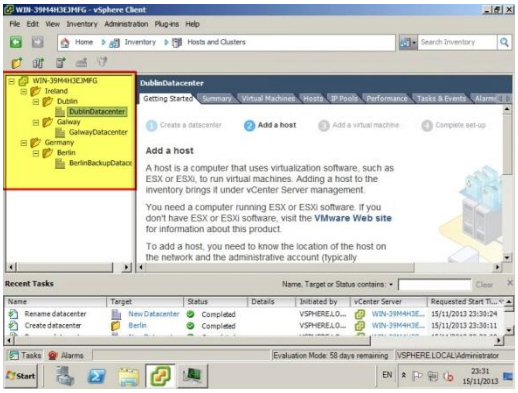


2. Add Datacenters to the appropriate location folder

a. Add a New Datacenter by right clicking on the folder and clicking *New Datacenter*

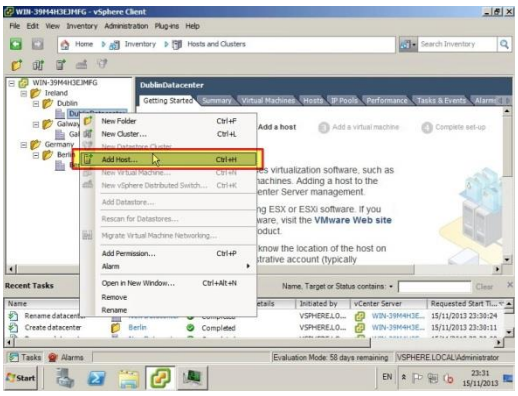


b. Do this for all of the appropriate Datacenters

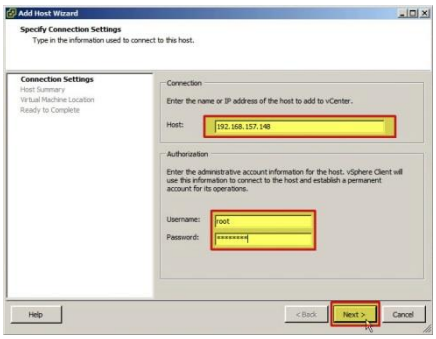


3. Add the appropriate Hosts to the Datacenters

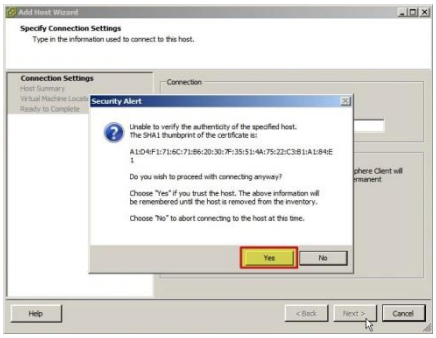
a. Right click on the Datacenter that you want to add the host to, and click *Add Host…*



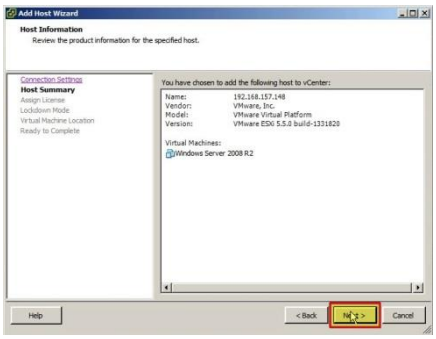
b. Enter the Host address, as well the username and password associated with it and click *Next >*


Add Host Wizard
Specify Connection Settings
Type in the information used to connect to this host.
Connection Settings
Host Summary
Virtual Machine Location
Ready to Complete
Connection
Enter the name or IP address of the host to add to vCenter.
Host:
192.168.157.148
Authorization
Enter the administrative account information for the host. vSphere Client will use this information to connect to the host and establish a permanent account for its operations.
Username:
root
Password:
Help
< Back
Next >
Cancel

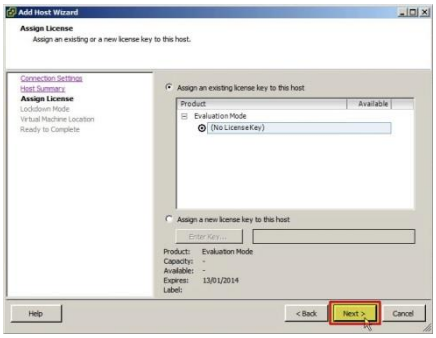
c. Click *Yes* to proceed, despite the fact that it is unable to verify the authenticity of the specified host


Add Host Wizard
Specify Connection Settings
Type in the information used to connect to this host.
Connection Settings
Connection
Security Alert
Unable to verify the authenticity of the specified host.
The SHA1 thumbprint of the certificate is:
Do you wish to proceed with connecting anyway?
Choose "Yes" if you trust the host. The above information will be remembered until the host is removed from the inventory.
Choose "No" to abort connecting to the host at this time.
Yes
No
Help
< Back
Next >
Cancel

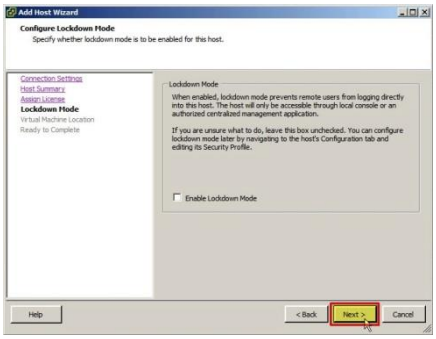
d. Verify that the correct host is selected and click *Next >*



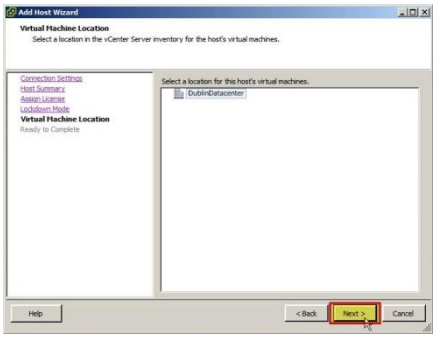
e. If you have a licence key, enter it here. Otherwise continue with *Evaluation Mode* and click *Next >*



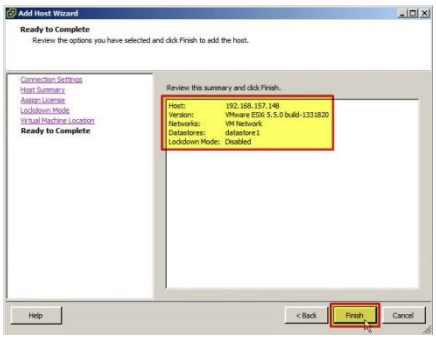
f. You can enable or disable *Lockdown Mode* here. Select as appropriate and click *Next >*


Add Host Wizard
Configure Lockdown Mode
Specify whether lockdown mode is to be enabled for this host.
Connection Settings
Host Summary
Assign License
Lockdown Mode
Virtual Machine Location
Ready to Complete
Lockdown Mode
When enabled, lockdown mode prevents remote users from logging directly into this host. The host will only be accessible through local console or an authorized centralized management application.
If you are unsure what to do, leave this box unchecked. You can configure lockdown mode later by navigating to the host's Configuration tab and editing its Security Profile.
Enable Lockdown Mode
Help
< Back
Next >
Cancel

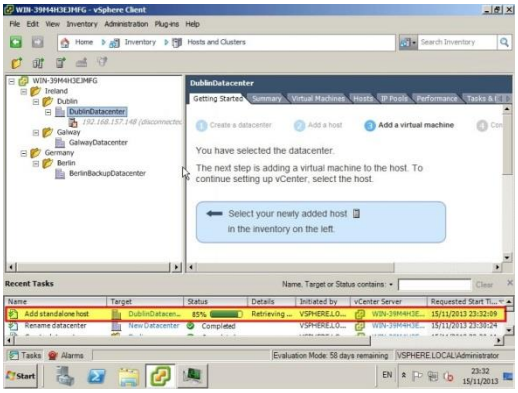
g. Select the location for the host's virtual machines as appropriate and click *Next >*



h. Verify all of the configurations and click *Finish*

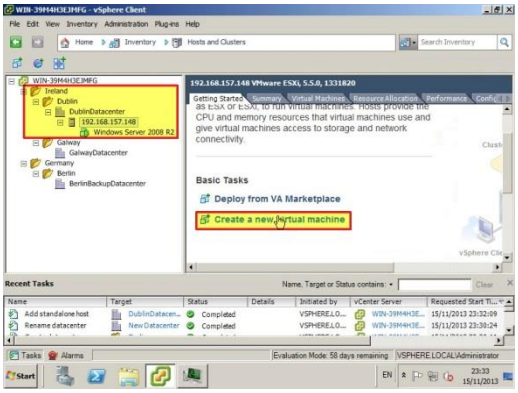


i. You can see the status of the task in the *Recent Tasks* tab at the bottom of the screen

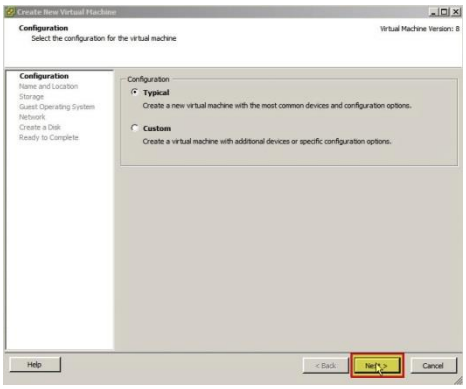

vSphere Client
DublinDatacenter
You have selected the datacenter.
The next step is adding a virtual machine to the host. To continue setting up vCenter, select the host.
Select your newly added host in the inventory on the left.
Recent Tasks
Add standalone host
Rename datacenter
Completed

4. Create virtual machines within these Hosts

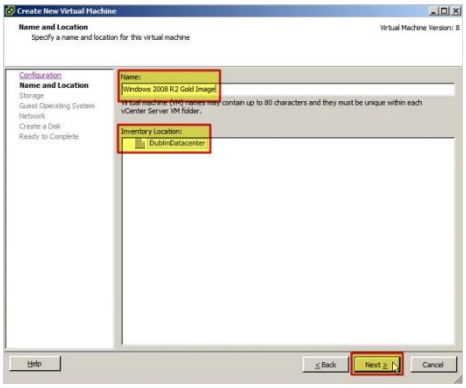
a. Click on the host that you want to create a virtual machine in. then click *Create a new virtual machine*



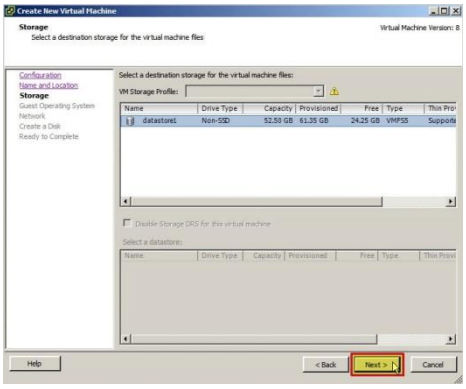
b. Select Typical as the configuration type and click *Next >*



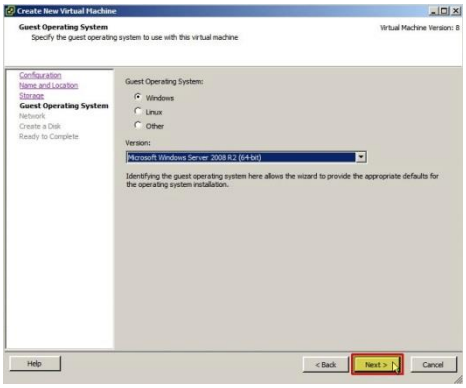
c. Enter the name of the virtual machine that you want to create, as well as the inventory location and click *Next >*



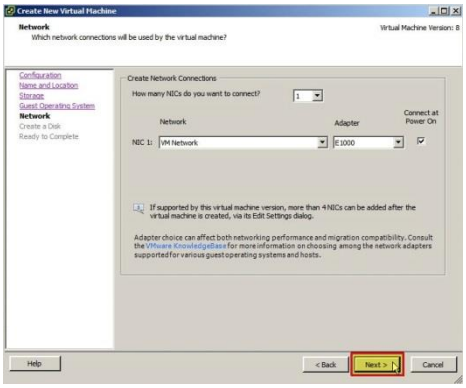
d. Select the location where you want to store the virtual machine files and click *Next >*



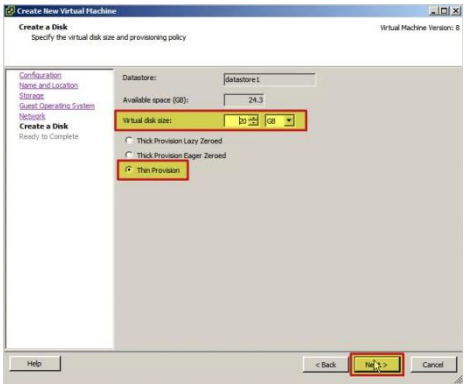
e. Specify the guest operating system to use with this virtual machine and click *Next >*



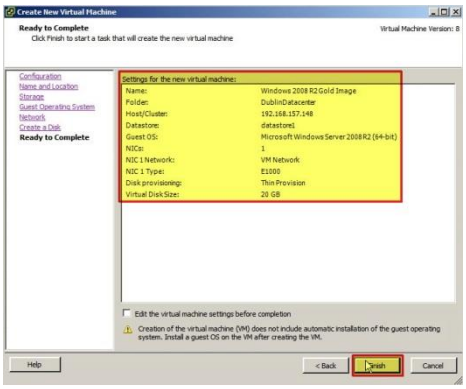
f. Configure the network connections as necessary and click *Next >*


Create New Virtual Machine
Network
Which network connections will be used by the virtual machine?
Virtual Machine Version: 8
Configuration
Name and Location
Storage
Guest Operating System
Network
Create a Disk
Ready to Complete
Create Network Connections
How many NICs do you want to connect?
1
Network
Adapter
Connect at Power On
NIC 1:
VM Network
E1000
If supported by this virtual machine version, more than 4 NICs can be added after the virtual machine is created, via its Edit Settings dialog.
Adapter choice can affect both networking performance and migration compatibility. Consult the VMware KnowledgeBase for more information on choosing among the network adapters supported for various guest operating systems and hosts.
Help
< Back
Next >
Cancel

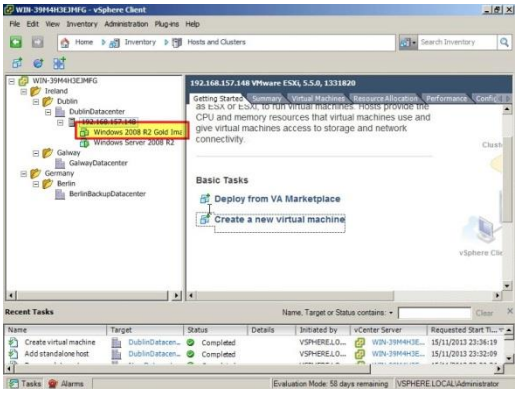
g. Select the virtual disk size that you want to create, select *Thin Provision* and click *Next >*



h. Verify all configurations and click *Finish*

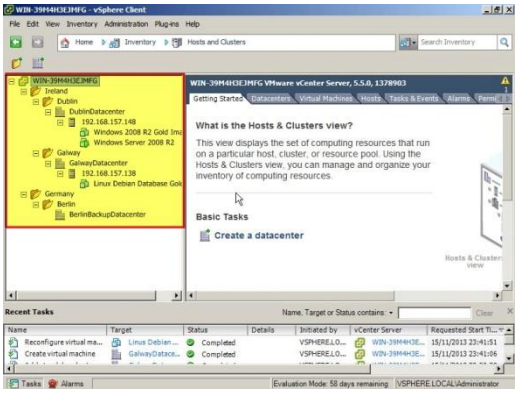

Create New Virtual Machine
Ready to Complete
Click Finish to start a task that will create the new virtual machine
Virtual Machine Version: 8
Configuration
Name and Location
Storage
Guest Operating System
Network
Create a Disk
Ready to Complete
Settings for the new virtual machine:
Name: Windows 2008 R2 Gold Image
Folder: DublinDatacenter
Host/Cluster: 192.168.157.148
Datastore: datastore1
Guest OS: Microsoft Windows Server 2008 R2 (64-bit)
NICs: 1
NIC 1 Network: VM Network
NIC 1 Type: E1000
Disk provisioning: Thin Provision
Virtual Disk Size: 20 GB
Edit the virtual machine settings before completion
Creation of the virtual machine (VM) does not include automatic installation of the guest operating system. Install a guest OS on the VM after creating the VM.
Help
< Back
Finish
Cancel

i. You can then see the virtual within the previously specified host


WIN-39M4H3E3MFG - vSphere Client
File Edit View Inventory Administration Plug-ins Help
Home Inventory Hosts and Clusters
Search Inventory
WIN-39M4H3E3MFG
Ireland
Dublin
DublinDatacenter
192.168.157.148
Windows 2008 R2 Gold Ima
Windows Server 2008 R2
Galway
GalwayDatacenter
Germany
Berlin
BerlinBackupDatacenter
192.168.157.148 VMware ESXi, 5.5.0, 1331820
Getting Started Summary Virtual Machines Resource Allocation Performance Conf
CPU and memory resources that virtual machines use and give virtual machines access to storage and network connectivity.
Basic Tasks
Deploy from VA Marketplace
Create a new virtual machine
Recent Tasks
Name, Target or Status contains:
Clear
Name Target Status Details Initiated by vCenter Server Requested Start Ti...
Create virtual machine DublinDatacen... Completed VSPHERE1.0... WIN-39M4H3E... 15/11/2013 23:36:19
Add standalone host DublinDatacen... Completed VSPHERE1.0... WIN-39M4H3E... 15/11/2013 23:32:09
Tasks Alarms
Evaluation Mode: 58 days remaining
VSPHERE.LOCAL\Administrator

5. Organise as appropriate

a. The organisation structure should look something like this when you are finished - Multiple folders, multiple Datacenters, multiple hosts and multiple virtual machines all organised suitably


WIN-39M4H3E3MFG - vSphere Client
File Edit View Inventory Administration Plug-ins Help
Home Inventory Hosts and Clusters
Search Inventory
WIN-39M4H3E3MFG
Ireland
Dublin
DublinDatacenter
192.168.157.148
Windows 2008 R2 Gold Ima
Windows Server 2008 R2
Galway
GalwayDatacenter
192.168.157.138
Linux Debian Database Gol
Germany
Berlin
BerlinBackupDatacenter
WIN-39M4H3E3MFG VMware vCenter Server, 5.5.0, 1378903
Getting Started Datacenters Virtual Machines Hosts Tasks & Events Alarms Permi
What is the Hosts & Clusters view?
This view displays the set of computing resources that run on a particular host, cluster, or resource pool. Using the Hosts & Clusters view, you can manage and organize your inventory of computing resources.
Basic Tasks
Create a datacenter
Hosts & Clusters view
Recent Tasks
Name, Target or Status contains:
Clear
Name Target Status Details Initiated by vCenter Server Requested Start Ti...
Reconfigure virtual ma... Linux Debian... Completed VSPHERE1.0... WIN-39M4H3E... 15/11/2013 23:41:51
Create virtual machine GalwayDatacen... Completed VSPHERE1.0... WIN-39M4H3E... 15/11/2013 23:41:06
Tasks Alarms
Evaluation Mode: 58 days remaining
VSPHERE.LOCAL\Administrator

Task A.4 - Creating, Managing and Reverting to a Snapshot

Task Overview

Within this task, a snapshot will be created, managed and reverted to. 'A snapshot is a picture of your system at the time the snapshot is taken.'[27] A snapshot contains the entire state of the virtual machine; memory, settings and disk state. 'The snapshot files that are created contain only the changes that have occurred to the virtual machine since the snapshot was taken.'[28] The snapshot files grow as the virtual machine is used. Hence, it is not recommended to create more than three snapshots. You can manage (delete and revert to) snapshots via the *Snapshot Manager*. You can take a snapshot when a VM is running, powered off or suspended. Although you can take a snapshot while a VM is running, it is a lot quicker if you take one when the VM is powered off.

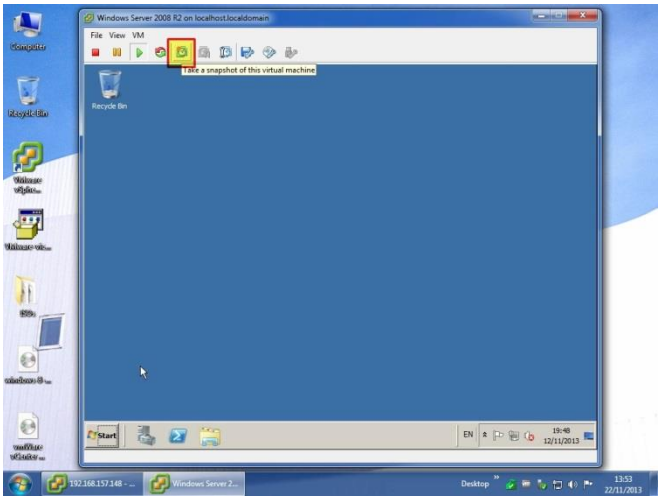
Snapshot Example

In the task below, I created a snapshot when I initially installed *Windows Server*. Then I installed all of the *Windows Updates*. When I was confident that there were no issues with these Updates, I created a new snapshot. I then installed *vCenter Server*. Initially I encountered a problem installing this. Hence, I reverted to the snapshot in order to return the OS to its original state (after the updates were installed). I could then start out a fresh, and try to install *vCenter Server* again. If I had not taken a snapshot, I may have had to install the whole OS again. This is the kind of situation where snapshots are typically used and can be invaluable.

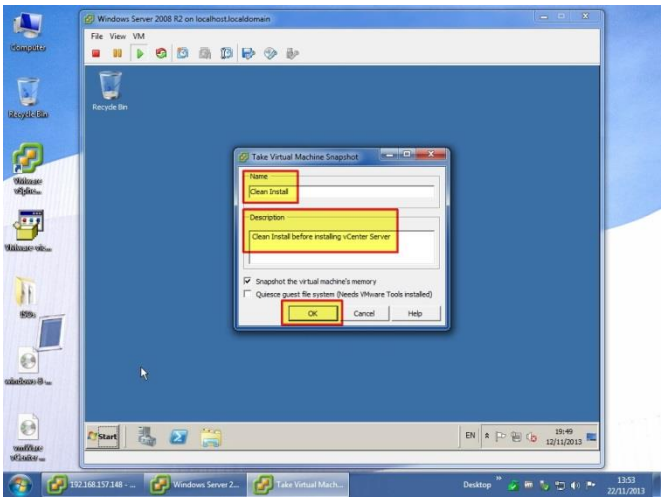
Task Guide

1. **Create snapshot of running Virtual Machine**

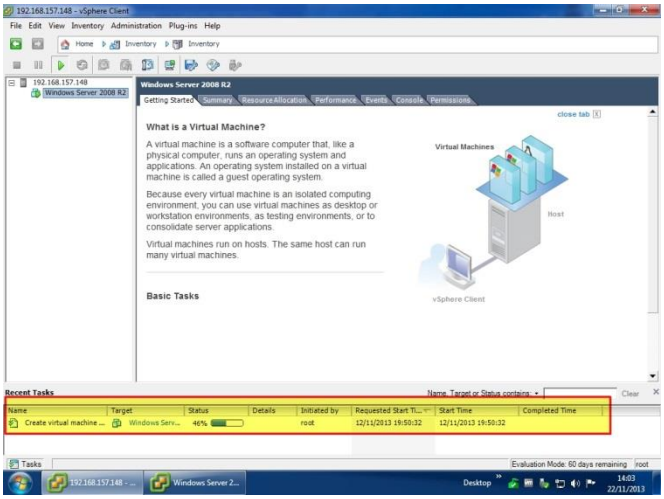
    a. Within the *Console View*, click the *Take a snapshot of this virtual machine* button



b. Name and describe the snapshot appropriately and click *OK*

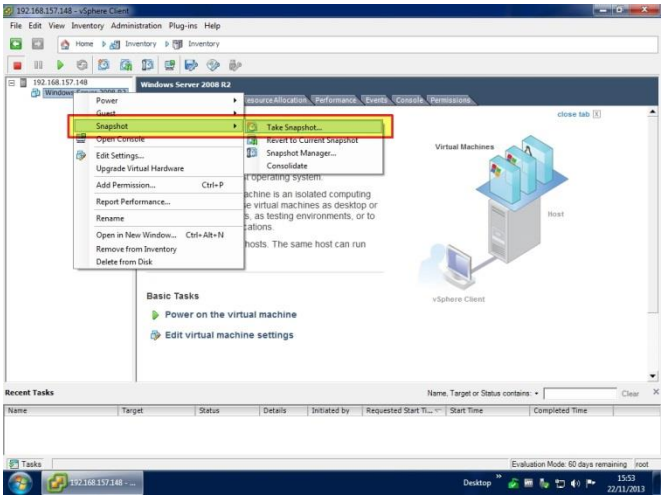


c. View the progress of this process in the bottom tab within *vSphere Client*

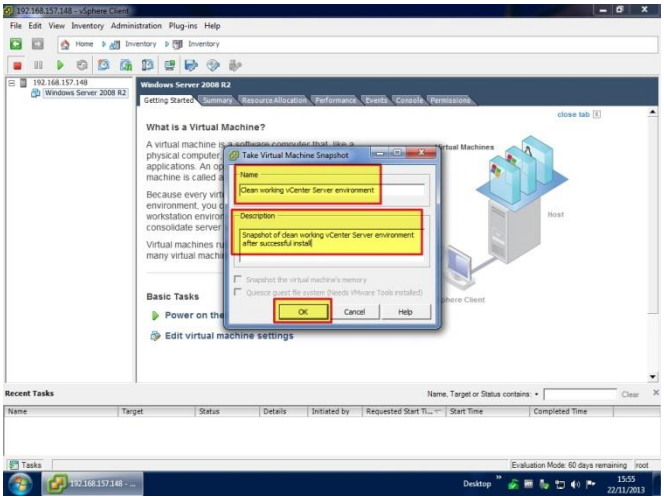

192.168.157.148 - vSphere Client
File Edit View Inventory Administration Plug-ins Help
Windows Server 2008 R2
Getting Started Summary Resource Allocation Performance Events Console Permissions
What is a Virtual Machine?
A virtual machine is a software computer that, like a physical computer, runs an operating system and applications. An operating system installed on a virtual machine is called a guest operating system.
Because every virtual machine is an isolated computing environment, you can use virtual machines as desktop or workstation environments, as testing environments, or to consolidate server applications.
Virtual machines run on hosts. The same host can run many virtual machines.
Basic Tasks
Virtual Machines
Host
vSphere Client
Recent Tasks
Name Target Status Details Initiated by Requested Start Ti... Start Time Completed Time
Create virtual machine ... Windows Serv... 46% root 12/11/2013 19:50:32 12/11/2013 19:50:32

2. Create snapshot of Virtual Machine that is not running

a. Right-click on the VM that you want to take a snapshot of, scroll over Snapshot and click *Take Snapshot…*

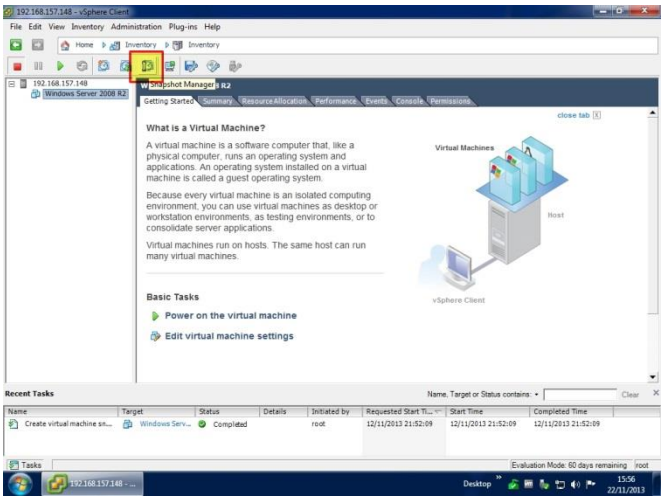


b. Name and describe the snapshot appropriately and click *OK*

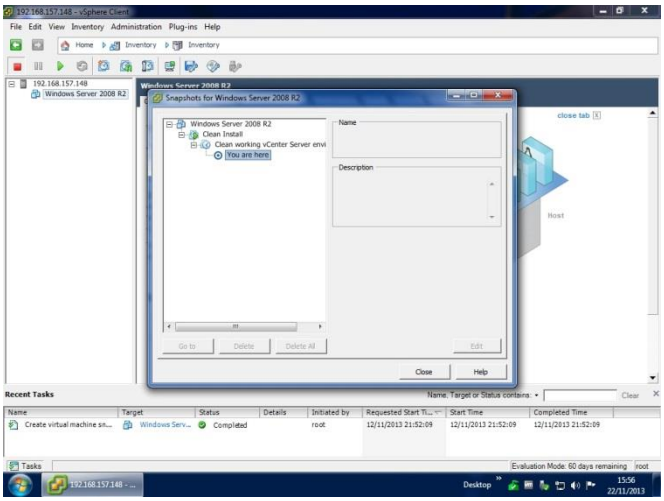


3. Open the *Virtual Machine Snapshot Manager*

a. Within *vSphere Client*, click on the *Snapshot Manager* button

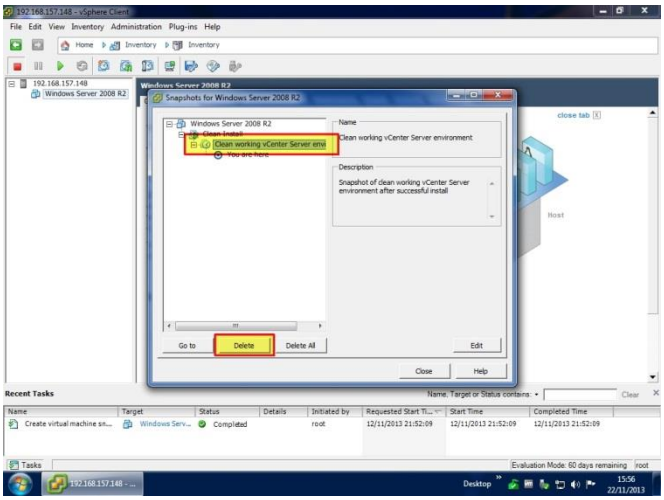


b. View all the snapshots that have been taken of that VM

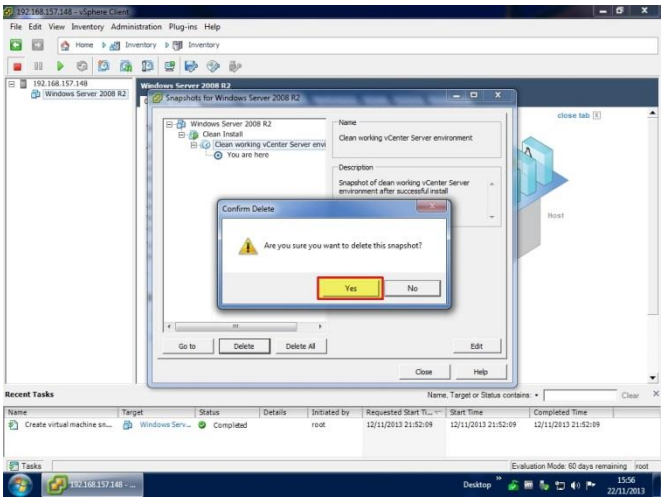


4. Delete a snapshot

a. Click on the snapshot that you want to delete and click *Delete*

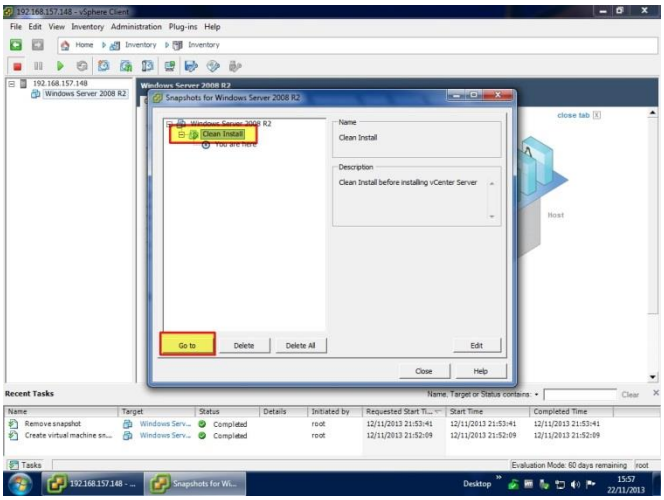


b. Click *Yes* when asked if you are sure

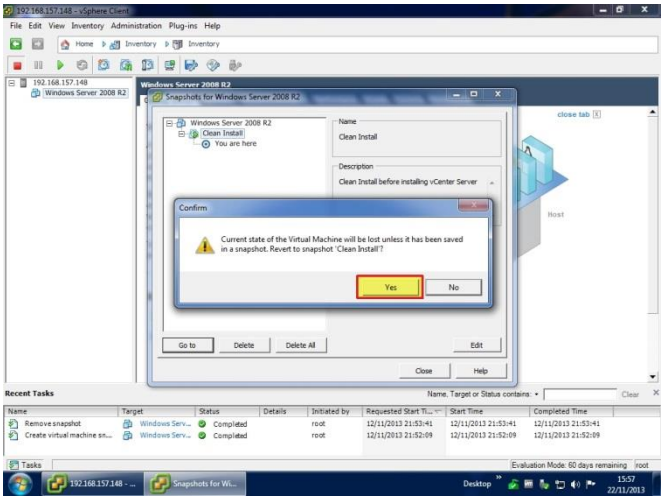


5. Revert to a snapshot

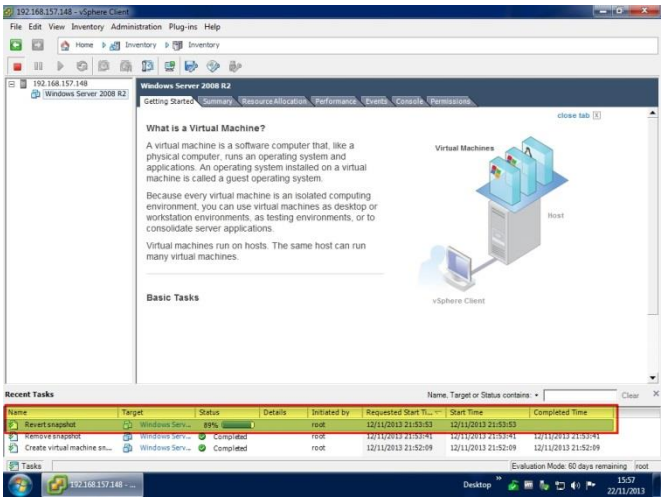
a. Click on the snapshot that you want to revert too and click *Go to*



b. Click *Yes* when prompted. Note that this will delete the current state of the machine



c. Note the progress in the tab at the bottom of *vSphere Client*


192.168.157.148 - vSphere Client
File Edit View Inventory Administration Plug-ins Help
Home Inventory Inventory
192.168.157.148
Windows Server 2008 R2
Windows Server 2008 R2
Getting Started Summary Resource Allocation Performance Events Console Permissions
close tab
What is a Virtual Machine?
A virtual machine is a software computer that, like a physical computer, runs an operating system and applications. An operating system installed on a virtual machine is called a guest operating system.
Because every virtual machine is an isolated computing environment, you can use virtual machines as desktop or workstation environments, as testing environments, or to consolidate server applications.
Virtual machines run on hosts. The same host can run many virtual machines.
Basic Tasks
Virtual Machines
Host
vSphere Client
Recent Tasks
Name, Target or Status contains:
Clear
Name Target Status Details Initiated by Requested Start Ti... Start Time Completed Time
Revert snapshot Windows Serv... 89% root 12/11/2013 21:53:53 12/11/2013 21:53:53
Remove snapshot Windows Serv... Completed root 12/11/2013 21:53:41 12/11/2013 21:53:41 12/11/2013 21:53:41
Create virtual machine sn... Windows Serv... Completed root 12/11/2013 21:52:09 12/11/2013 21:52:09 12/11/2013 21:52:09
Tasks
Evaluation Mode: 60 days remaining root
192.168.157.148 - ...
Desktop
15:57
22/11/2013

d. Once completed, simply power on the virtual machine and it will return to the snapshot

Task A.5 - Creating a Gold Image (Template)

Task Overview

A 'Gold Image', or 'Master Image', is a template of a virtual machine in a pristine state. 'Templates are a reservoir of specifically configured virtual machines ready to be deployed to a host within vCenter.'[29] An administrator first creates a virtual machine and installs an Operating System. Updates are applied to this OS and any necessary applications are installed. Any specific configurations are applied to the operating system and applications. An image of this virtual machine can then be taken and converted to a template. A template is a virtual machine in a 'non-powerable' state. This means that the template cannot be changed without converting it back to a virtual machine. Templates can then be deployed as necessary. When deployed, a copy of the template is made, but is in the format of a virtual machine and can be powered on. 'The use of golden images can save time and ensure consistency by eliminating the need for repetitive configuration changes and performance tweaks.'[30] A template can be deployed to any host in the *vCenter Server* environment. As OS and application installations, updates and configurations only have to be completed once, much time can be saved.

For further information relating to the task outlined, please see Scott Lowe's Mastering VMware vSphere 5, Chapter 10.[31]

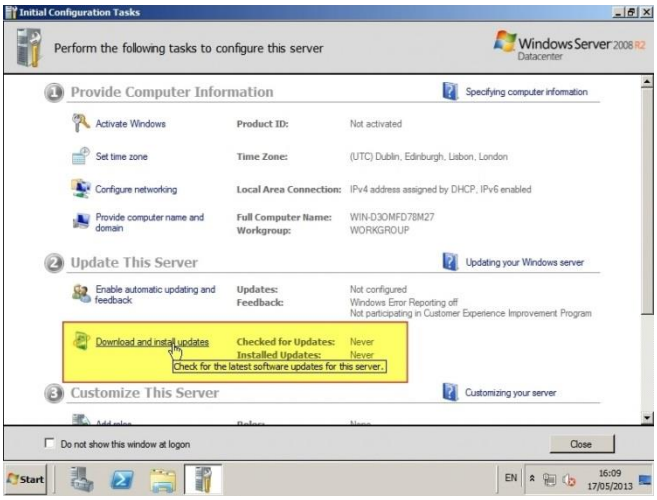
Technical Issues

Templates take up space, so the appropriate disk space must be available. *vCenter Server* is also required.

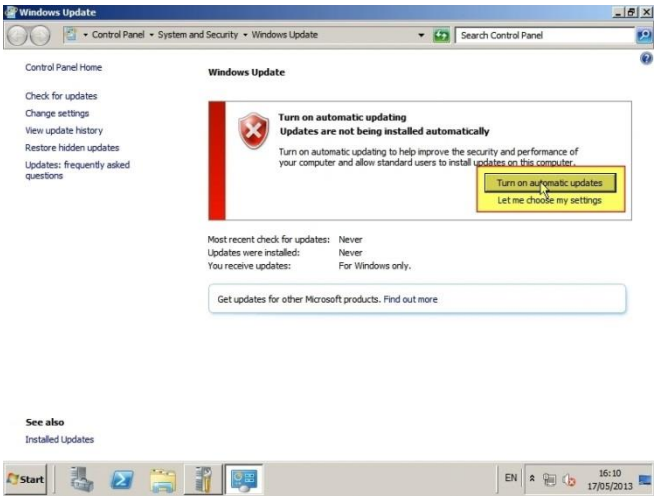
Task Guide

1. **Update Operating System and Applications appropriately**

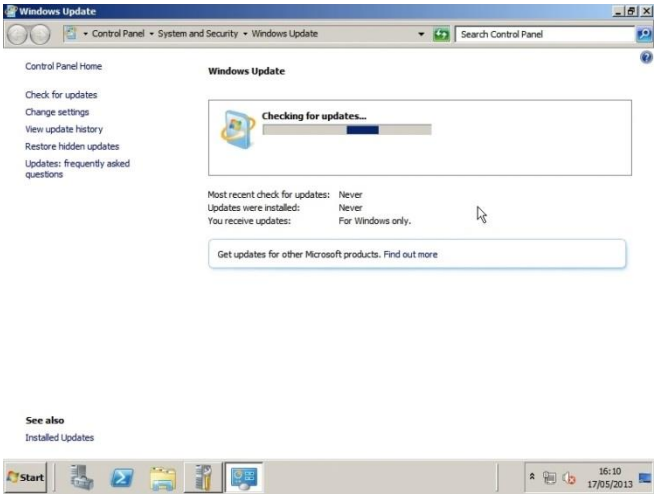
    a. Within the *Initial Configuration Tasks* view that appears when you initially turn on *Windows Server 2008 R2*, click *Download and install updates*



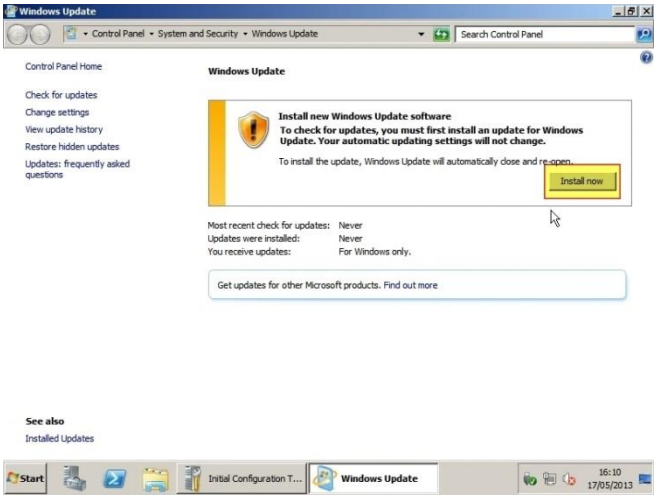
b. Click *Turn on automatic updates*


Windows Update
Control Panel • System and Security • Windows Update
Search Control Panel
Control Panel Home
Check for updates
Change settings
View update history
Restore hidden updates
Updates: frequently asked questions
Windows Update
Turn on automatic updating
Updates are not being installed automatically
Turn on automatic updating to help improve the security and performance of your computer and allow standard users to install updates on this computer.
Turn on automatic updates
Let me choose my settings
Most recent check for updates: Never
Updates were installed: Never
You receive updates: For Windows only.
Get updates for other Microsoft products. Find out more
See also
Installed Updates
Start
EN
16:10
17/05/2013

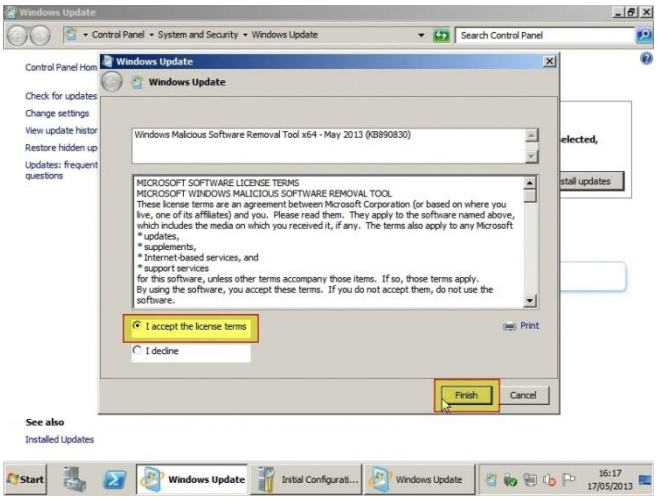
c. Allow *Windows Update* check for updates



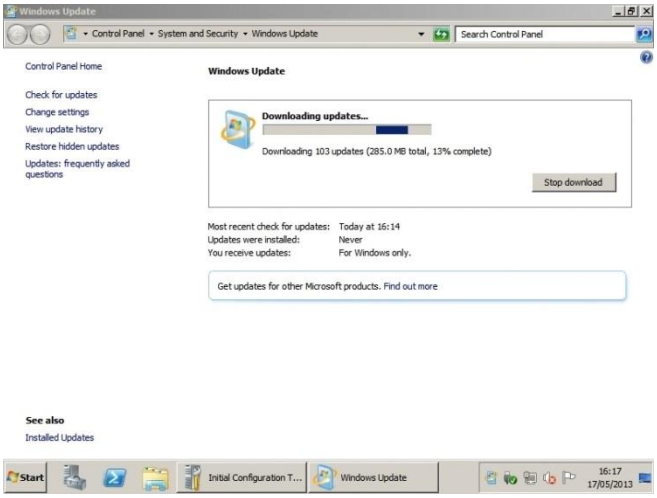
d. When updates are found, click *Install now*


Windows Update
Control Panel • System and Security • Windows Update
Search Control Panel
Control Panel Home
Check for updates
Change settings
View update history
Restore hidden updates
Updates: frequently asked questions
Windows Update
Install new Windows Update software
To check for updates, you must first install an update for Windows Update. Your automatic updating settings will not change.
To install the update, Windows Update will automatically close and re-open.
Install now
Most recent check for updates: Never
Updates were installed: Never
You receive updates: For Windows only.
Get updates for other Microsoft products. Find out more
See also
Installed Updates
Start
Initial Configuration T...
Windows Update
16:10
17/05/2013

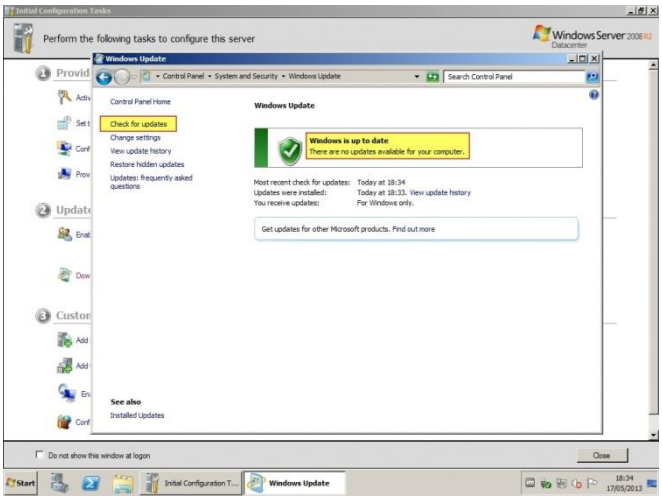
e. Click *I accept the licence terms* and click *Finish*


Windows Update
Control Panel • System and Security • Windows Update
Search Control Panel
Windows Update
Windows Malicious Software Removal Tool x64 - May 2013 (KB890830)
MICROSOFT SOFTWARE LICENSE TERMS
MICROSOFT WINDOWS MALICIOUS SOFTWARE REMOVAL TOOL
These license terms are an agreement between Microsoft Corporation (or based on where you live, one of its affiliates) and you. Please read them. They apply to the software named above, which includes the media on which you received it, if any. The terms also apply to any Microsoft
* updates,
* supplements,
* Internet-based services, and
* support services
for this software, unless other terms accompany those items. If so, those terms apply.
By using the software, you accept these terms. If you do not accept them, do not use the software.
I accept the license terms
I decline
Print
Finish
Cancel
See also
Installed Updates
Start
Windows Update
Initial Configurati...
Windows Update
16:17
17/05/2013

f. Continue to download and install updates

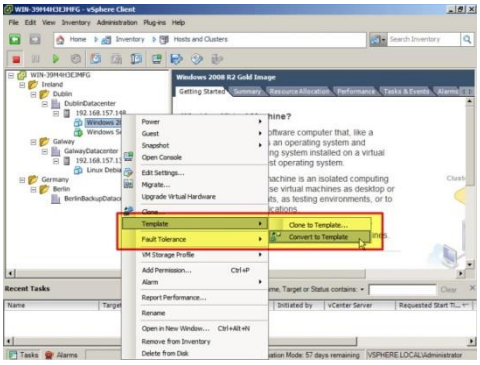


g. When the follow screen appears, then all of the updates have been installed. It says *Windows is up to date*

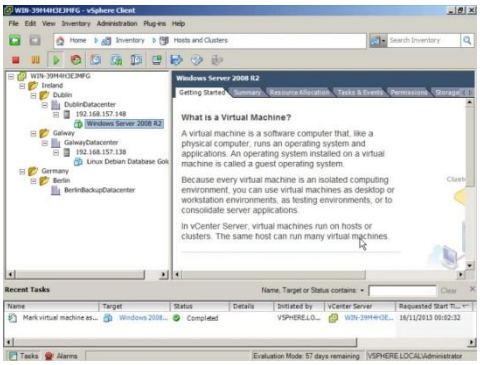

Initial Configuration Tasks
Perform the following tasks to configure this server
Windows Server 2008 R2
Windows Update
Control Panel • System and Security • Windows Update
Search Control Panel
Control Panel Home
Check for updates
Change settings
View update history
Restore hidden updates
Updates: frequently asked questions
Windows Update
Windows is up to date
There are no updates available for your computer.
Most recent check for updates: Today at 18:34
Updates were installed: Today at 18:33. View update history
You receive updates: For Windows only.
Get updates for other Microsoft products. Find out more
See also
Installed Updates
Do not show this window at logon
Close
Start
Initial Configuration T...
Windows Update
18:34
17/05/2013

2. Convert or Clone the virtual machine to a template

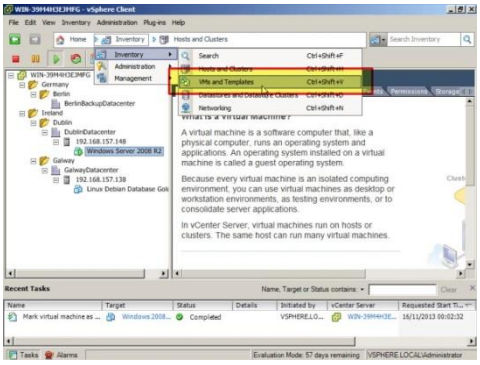
a. Right-click on the virtual machine that you want to clone and click *Template - Convert to Template*



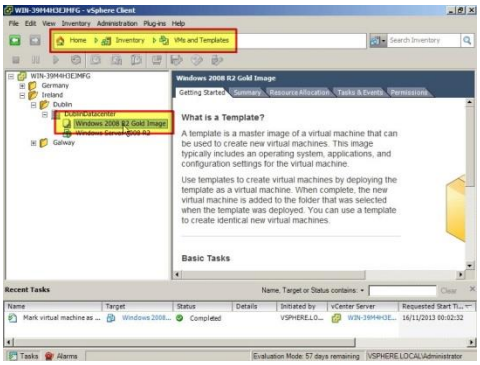
b. The virtual machine disappears from the *Hosts and Clusters* view



c. In order to view the virtual machine, you must go to the *VMs and Templates* view. Click on the *Inventory* at the top of the page, scroll over *Inventory* and click *VMs and Templates*



d. You can now see the created template within the specified host. It has a different icon beside it indicating that it is a template and is ready for deployment


Windows 2008 R2 Gold Image
What is a Template?
A template is a master image of a virtual machine that can be used to create new virtual machines. This image typically includes an operating system, applications, and configuration settings for the virtual machine.
Use templates to create virtual machines by deploying the template as a virtual machine. When complete, the new virtual machine is added to the folder that was selected when the template was deployed. You can use a template to create identical new virtual machines.
Basic Tasks
Recent Tasks

Task A.6 - Deploying a Virtual Machine using a Gold Image

Task Overview

An issue that arises from using Templates is that any deployed virtual machines are exact replicas of the template, and therefore are not unique. This can lead to issues such as naming and network conflicts, as well as licencing issues. Tools like *sysprep* can be used to ensure uniqueness on deployment (for *Windows*). *Sysprep* ensures that all unique information relating to a particular system is fully unique. With *VMware*, you can use the *Customisation Specification Manager* within *vCenter Server* to aid this process. '*vCenter Server's Customization Specification* works hand-in-hand with the tools for customizing VM clones (*Sysprep* for VMs with a *Windows*-based guest OS, open source tools for a VM with a Linux-based guest OS)…This includes information such as the IP address, passwords, computer name, and licensing information. A customization specification allows an administrator to provide all the information only once and then apply it as needed when cloning a VM.'[32] You can create multiple *Customization Specifications* for various systems using the *Customization Specifications Manager*. *Customization Specification* allows you to customize what *sysprep* does. For example, you can define a Computer Name and tell it to iterate the numbers to ensure uniqueness. This ensures that you can deploy the template without having to change these unique identifiers every time you deploy it, as this is done automatically.

In this task, we will deploy a virtual machine from the template created in the previous task (Task A.5). In order to ensure the uniqueness of each deployed system, we are going to first configure a *Customization Specification*. We will then deploy the virtual machine using the appropriate configurations and turn it on.

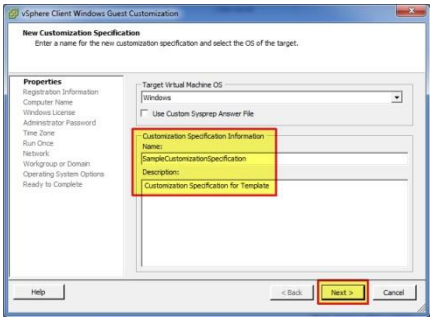
For further information relating to the task outlined, please see Scott Lowe's Mastering VMware vSphere 5, Chapter 10.[33]

Task Guide

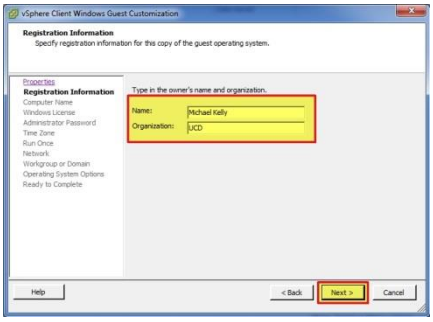
1. **Create a Customization Specification using the Customization Specification Manager**

    a. Within *vCenter Server*, open the *Customization Specification Manager* by pressing *Ctrl+Shift+U*. Then click *New*

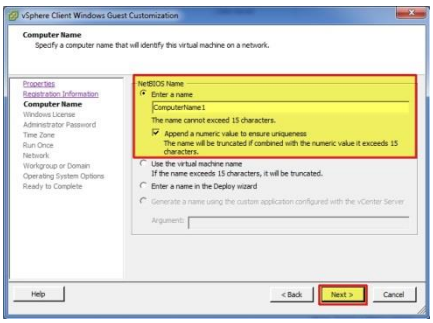
    b. *Name* the *Customization Specification* and write a *description* of what it will be used for and what it does and click *Next >*



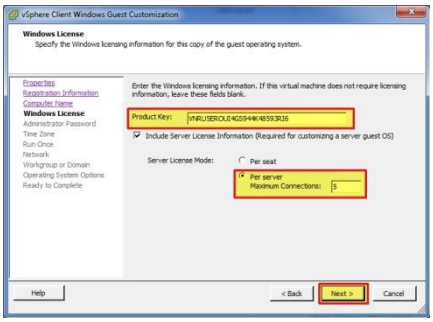
c. Type in your *name* and the *organizations name* and click *Next >*



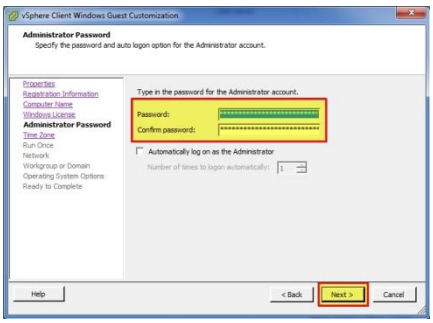
d. Type the name that you want to give to the computer. Also select whether you want the numeric values within this name to iterate. Then press *Next >*


vSphere Client Windows Guest Customization
Computer Name
Specify a computer name that will identify this virtual machine on a network.
Properties
Registration Information
Computer Name
Windows License
Administrator Password
Time Zone
Run Once
Network
Workgroup or Domain
Operating System Options
Ready to Complete
NetBIOS Name
Enter a name
ComputerName1
The name cannot exceed 15 characters.
Append a numeric value to ensure uniqueness
The name will be truncated if combined with the numeric value it exceeds 15 characters.
Use the virtual machine name
If the name exceeds 15 characters, it will be truncated.
Enter a name in the Deploy wizard
Generate a name using the custom application configured with the vCenter Server
Argument:
Help
< Back
Next >
Cancel

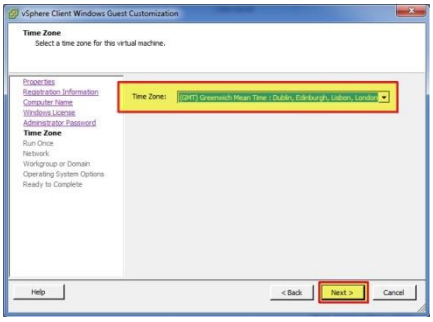
e. Put in a product key for the OS, select the maximum number of connections that can be active at one time and click *Next >*



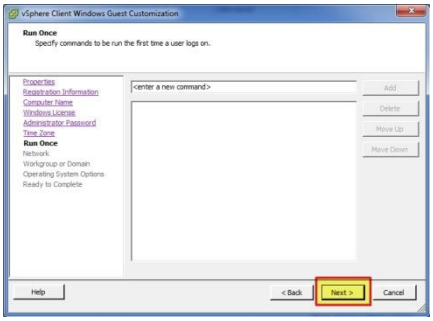
f. Insert an administrators password and click *Next >*



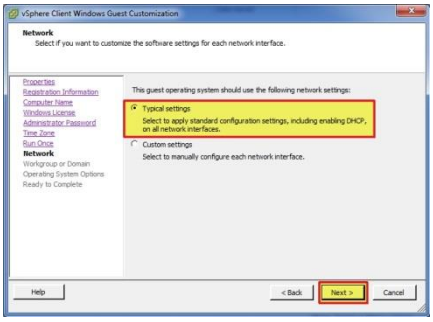
g. Select the appropriate *Time Zone* and click *Next >*



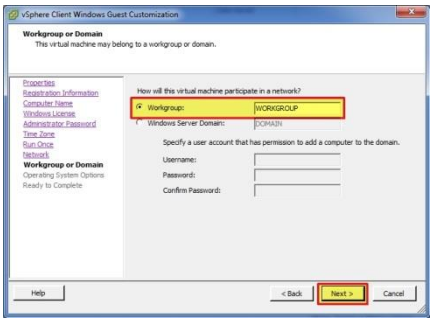
h. If you want to run a script, add It here or enter commands. Then click *Next >*



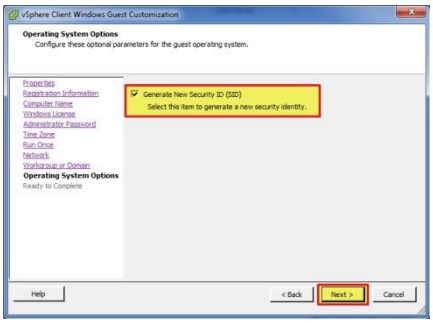
i. Select Typical settings if you want to use DHCP or use Custom settings for static IP assignment. The click *Next >*



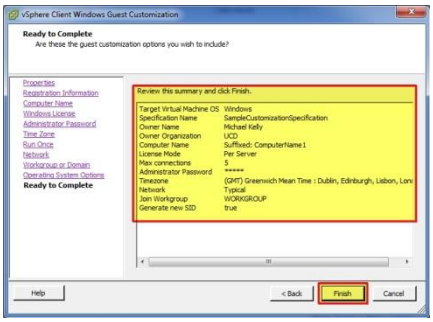
j. Connect the computer to the appropriate *Workgroup* or *Domain* and click *Next >*



k. Make sure the box is ticked beside *Generate Security ID (SID)* and click *Next >*

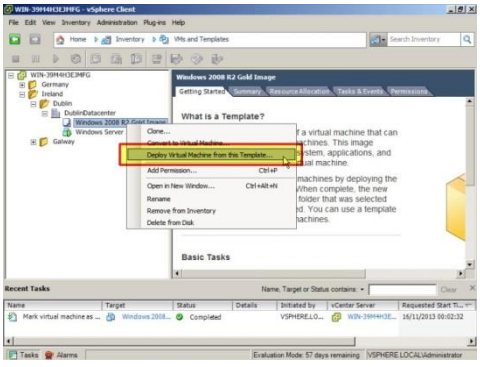


l. Finally, confirm all of the settings that you have configured. Once you are happy with them click *Finish*

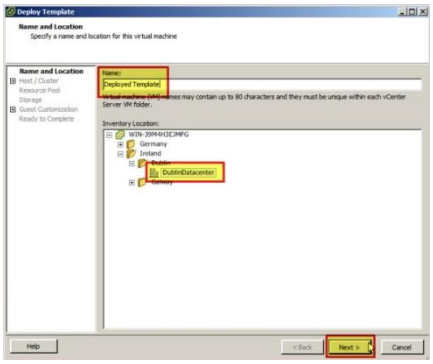


2. Deploy a Virtual Machine from a Template

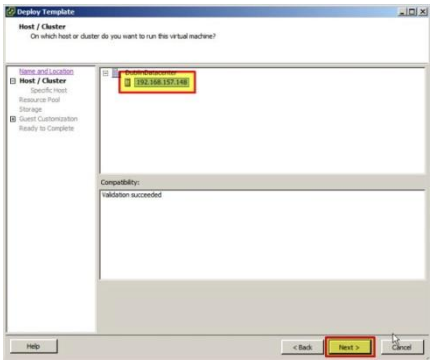
a. Right-click on the template, and click *Deploy Virtual Machine from this Template…*



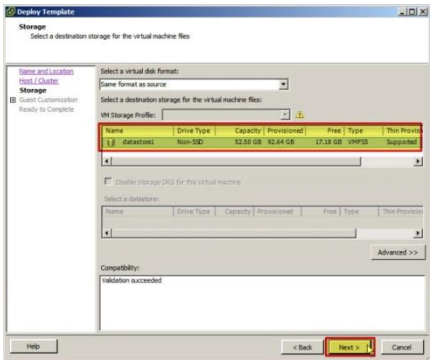
b. Name the virtual machine that you wish to deploy and select the Datacenter that you want it in. Then click *Next >*



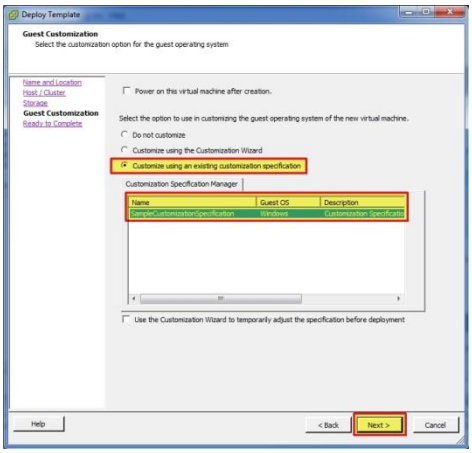
c. Select the host or cluster in which you want to run the virtual machine. Then click *Next >*



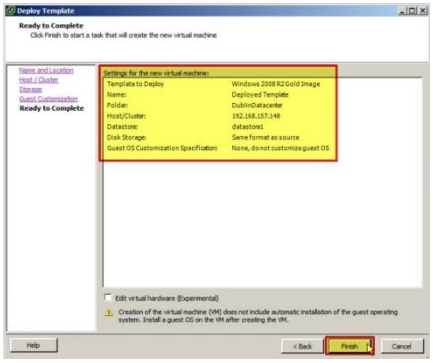
d. Select the destination storage for the virtual machine files and click *Next >*



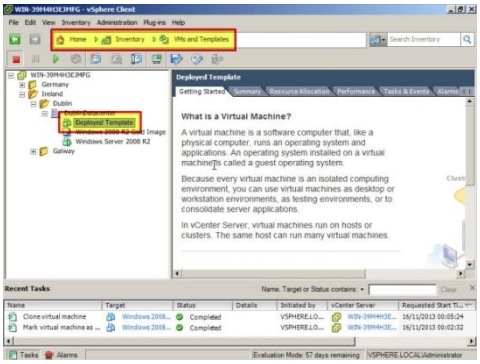
e. Select the Guest Customisation configured earlier and click *Next >*


Deploy Template
Guest Customization
Select the customization option for the guest operating system
Name and Location
Host / Cluster
Storage
Guest Customization
Ready to Complete
Power on this virtual machine after creation.
Select the option to use in customizing the guest operating system of the new virtual machine.
Do not customize
Customize using the Customization Wizard
Customize using an existing customization specification
Customization Specification Manager
Name
Guest OS
Description
Use the Customization Wizard to temporarily adjust the specification before deployment
Help
< Back
Next >
Cancel

f. Verify all defined configurations and click *Finish*



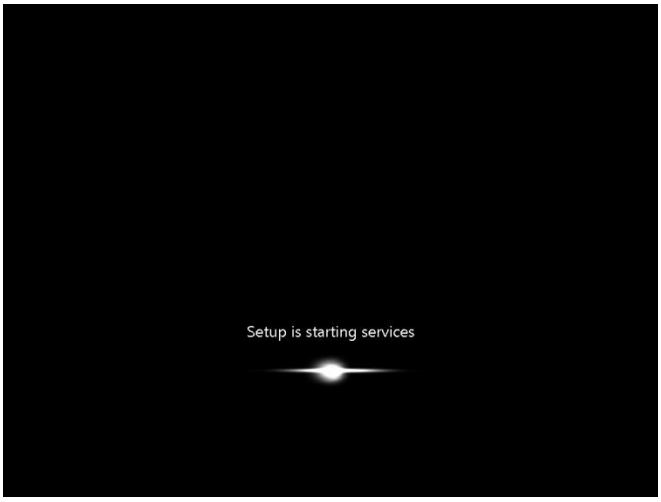
g. The deployed template now shows up in the location that you specified



3. Turn on the virtual machine

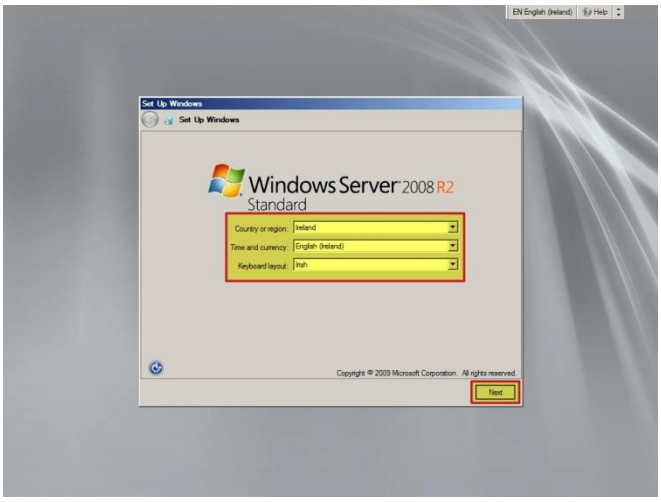
a. As with any virtual machine, power it on. As *Configuration Specification* was selected when deploying the template, the *registry settings update*

b. The virtual machine then starts up services, etc.

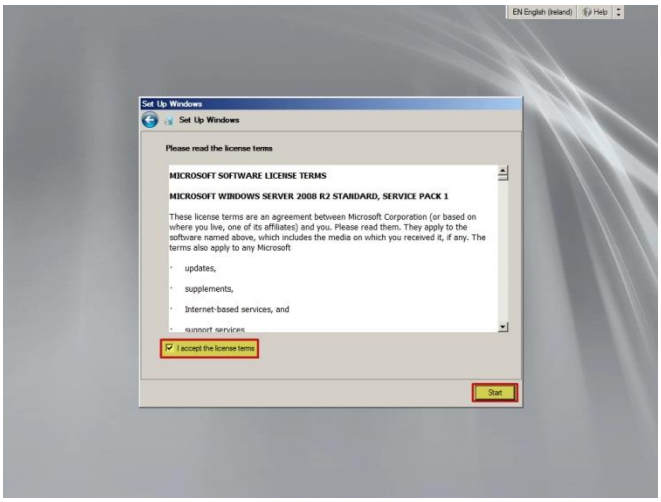


c. It also installs any necessary devices

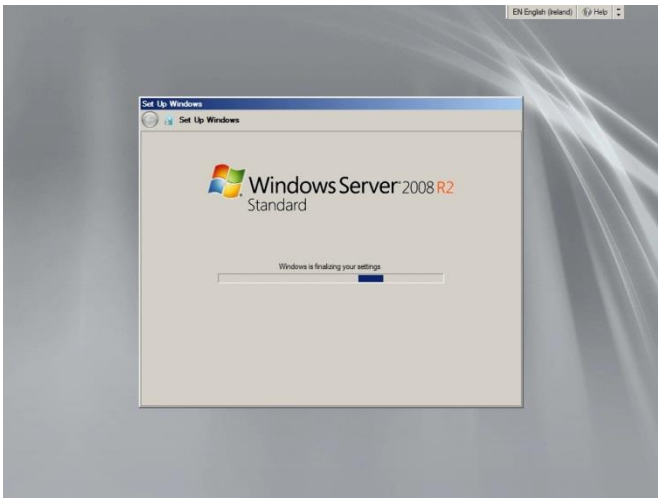
d. Configure the country/region, Time and currency and Keyboard layout as necessary and click *Next*



e. Click *I accept the licence terms* and click *Start*


EN English (Ireland)
Help
Set Up Windows
Set Up Windows
Please read the license terms
MICROSOFT SOFTWARE LICENSE TERMS
MICROSOFT WINDOWS SERVER 2008 R2 STANDARD, SERVICE PACK 1
These license terms are an agreement between Microsoft Corporation (or based on where you live, one of its affiliates) and you. Please read them. They apply to the software named above, which includes the media on which you received it, if any. The terms also apply to any Microsoft
updates,
supplements,
Internet-based services, and
support services
I accept the license terms
Start

f. Windows finalises the specified settings



g. The login screen then appears. Press *Ctrl, Alt and Delete* to log on as usual

Task A.7 - Converting a Physical Computer to a Virtual Computer

Task Overview

Physical to Virtual (P2V) conversions can be very useful when converting to a virtualised environment. P2V software has the ability to convert a physical machine into virtual machine files. This includes everything - OS, configuration, data files, etc. If you have multiple servers already in place, you could do a P2V conversion and then all that is required is to import the virtual machine into the VMM. This would save you from fully configuring every server again, although you would still have some changes to make.

In this task, we will be doing a P2V conversion within *VMware Workstation*. In order to do this, you have to install additional software - *VMware vCenter Converter*.

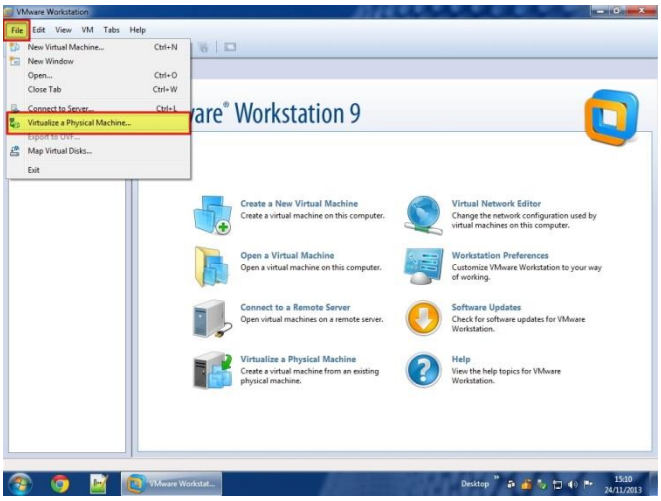
Technical Issues

VMware Workstation is required. *VMware vCenter Converter* is also necessary. This can be installed as demonstrated below. You need enough disk space to save the virtualised physical machine file onto as well. You also need to have a screen resolution of at least 1024x768 pixels. For a full list of system requirements, please see *VMware's* website.[34]

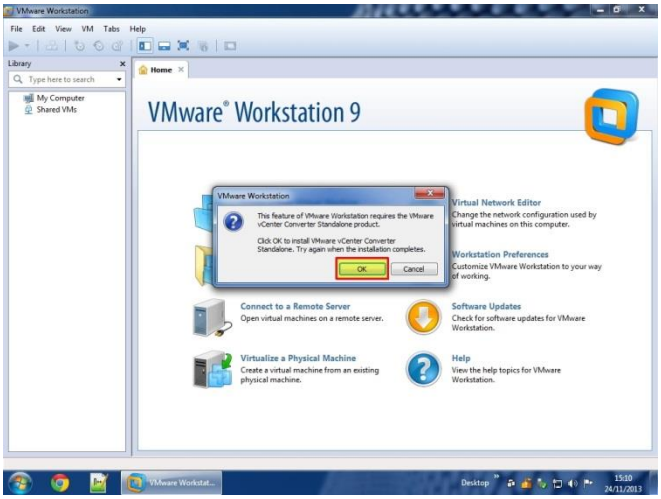
Task Guide

1. **Install *VMware vCenter Converter***

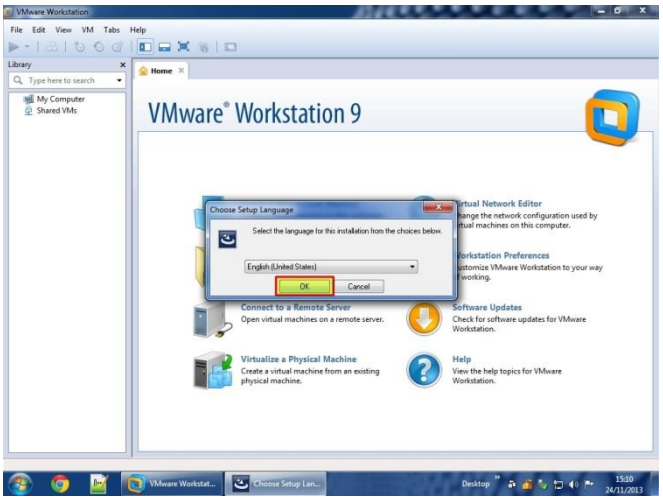
    a. Click *File* - *Virtualize a Physical Machine…*


VMware Workstation
File Edit View VM Tabs Help
New Virtual Machine... Ctrl+N
New Window
Open... Ctrl+O
Close Tab Ctrl+W
Virtualize a Physical Machine...
Map Virtual Disks...
Exit
Workstation 9
Create a New Virtual Machine
Create a virtual machine on this computer.
Virtual Network Editor
Change the network configuration used by virtual machines on this computer.
Open a Virtual Machine
Open a virtual machine on this computer.
Workstation Preferences
Customize VMware Workstation to your way of working.
Connect to a Remote Server
Open virtual machines on a remote server.
Software Updates
Check for software updates for VMware Workstation.
Virtualize a Physical Machine
Create a virtual machine from an existing physical machine.
Help
View the help topics for VMware Workstation.

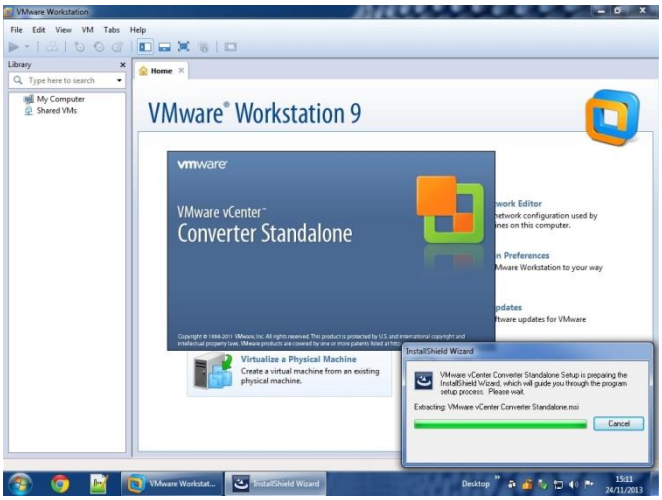
b. A notification appear saying that *vCenter Converter* must be installed. Click *OK*


VMware Workstation
File Edit View VM Tabs Help
Library
Type here to search
My Computer
Shared VMs
Home
VMware® Workstation 9
VMware Workstation
This feature of VMware Workstation requires the VMware vCenter Converter Standalone product.
Click OK to install VMware vCenter Converter Standalone. Try again when the installation completes.
OK
Cancel
Virtual Network Editor
Change the network configuration used by virtual machines on this computer.
Workstation Preferences
Customize VMware Workstation to your way of working.
Connect to a Remote Server
Open virtual machines on a remote server.
Software Updates
Check for software updates for VMware Workstation.
Virtualize a Physical Machine
Create a virtual machine from an existing physical machine.
Help
View the help topics for VMware Workstation.

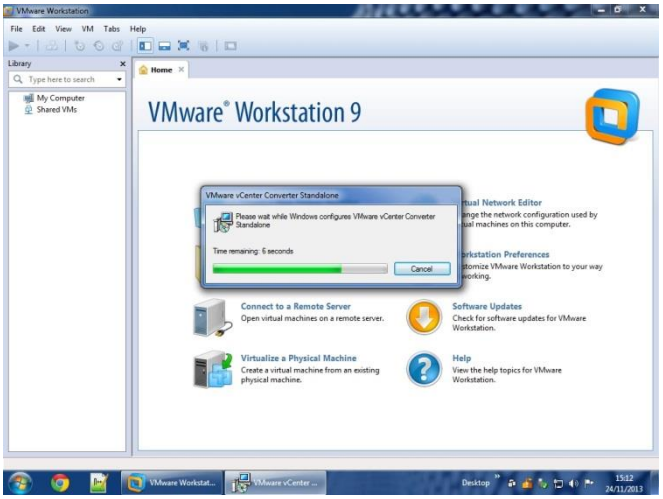
c. Select the appropriate language and click *OK*



d. The *VMware vCenter Converter* installation initialises. Wait for it to load


VMware Workstation
File Edit View VM Tabs Help
Library
Type here to search
My Computer
Shared VMs
Home
VMware® Workstation 9
vmware
VMware vCenter
Converter Standalone
Virtualize a Physical Machine
Create a virtual machine from an existing physical machine.
InstallShield Wizard
VMware vCenter Converter Standalone Setup is preparing the InstallShield Wizard, which will guide you through the program setup process. Please wait.
Extracting: VMware vCenter Converter Standalone.msi
Cancel

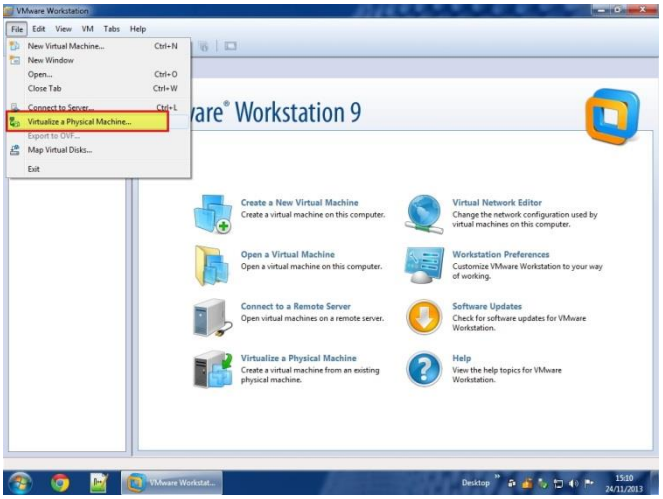
e. The *VMware vCenter Converter* installation continues to initialise. Wait for it to load


VMware Workstation
File Edit View VM Tabs Help
Library
Type here to search
My Computer
Shared VMs
Home
VMware® Workstation 9
VMware vCenter Converter Standalone
Please wait while Windows configures VMware vCenter Converter Standalone
Time remaining: 6 seconds
Cancel
Connect to a Remote Server
Open virtual machines on a remote server.
Software Updates
Check for software updates for VMware Workstation.
Virtualize a Physical Machine
Create a virtual machine from an existing physical machine.
Help
View the help topics for VMware Workstation.

f. Note that no verification that the installation has completes shows up

2. Virtualise the appropriate virtual machine

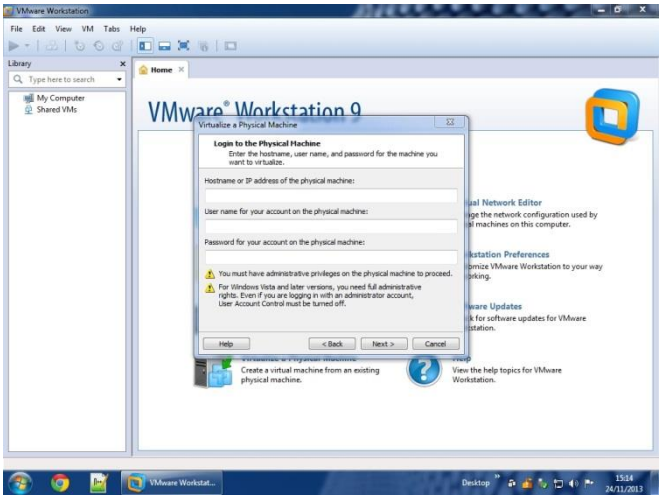
a. Click *File* - *Virtualize a Physical Machine…* again


VMware Workstation
File Edit View VM Tabs Help
New Virtual Machine... Ctrl+N
New Window
Open... Ctrl+O
Close Tab Ctrl+W
Connect to Server... Ctrl+L
Virtualize a Physical Machine...
Export to OVF...
Map Virtual Disks...
Exit
Workstation 9
Create a New Virtual Machine
Create a virtual machine on this computer.
Virtual Network Editor
Change the network configuration used by virtual machines on this computer.
Open a Virtual Machine
Open a virtual machine on this computer.
Workstation Preferences
Customize VMware Workstation to your way of working.
Connect to a Remote Server
Open virtual machines on a remote server.
Software Updates
Check for software updates for VMware Workstation.
Virtualize a Physical Machine
Create a virtual machine from an existing physical machine.
Help
View the help topics for VMware Workstation.

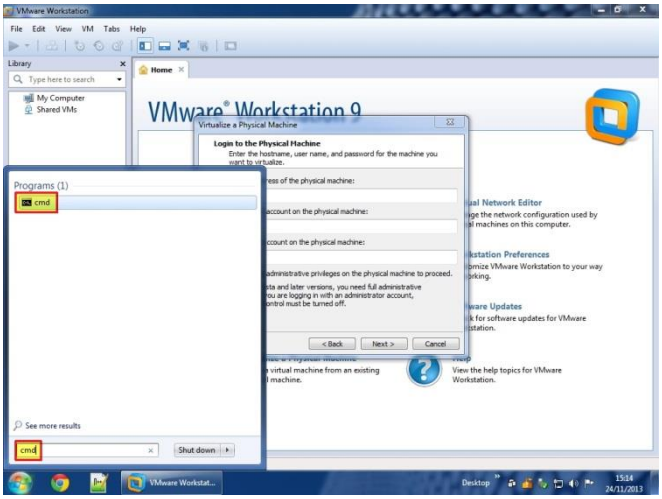
b. Click *Next* >

VMware Workstation
File Edit View VM Tabs Help
Library
Type here to search
My Computer
Shared VMs
Home
VMware Workstation 9
Virtualize a Physical Machine
Welcome to the Physical Machine Virtualization Wizard
This wizard helps you create a new virtual machine from a physical machine running Windows.
The new virtual machine will be created with the physical machine's applications, documents, and settings.
VMware Workstation 9
Help
< Back
Next >
Cancel
Create a virtual machine from an existing physical machine.
View the help topics for VMware Workstation.
Desktop
15:14
24/11/2013

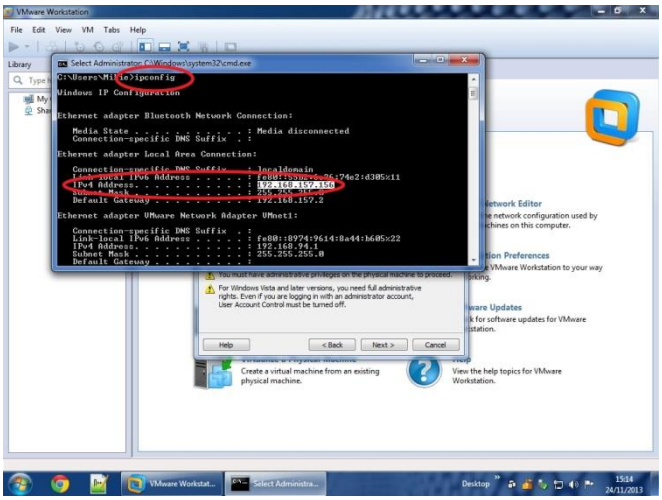
c. You must login to the physical machine and get its IP address


VMware Workstation
File Edit View VM Tabs Help
Library
Type here to search
My Computer
Shared VMs
Home
VMware Workstation 9
Virtualize a Physical Machine
Login to the Physical Machine
Enter the hostname, user name, and password for the machine you want to virtualize.
Hostname or IP address of the physical machine:
User name for your account on the physical machine:
Password for your account on the physical machine:
You must have administrative privileges on the physical machine to proceed.
For Windows Vista and later versions, you need full administrative rights. Even if you are logging in with an administrator account, User Account Control must be turned off.
Help
< Back
Next >
Cancel
Create a virtual machine from an existing physical machine.
View the help topics for VMware Workstation.
Desktop
15:14
24/11/2013

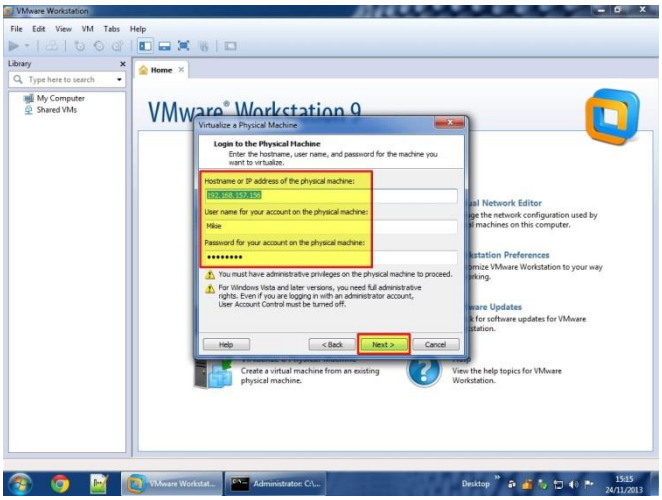
d. Click on the start menu and search for cmd. Once it appears, press *Enter*



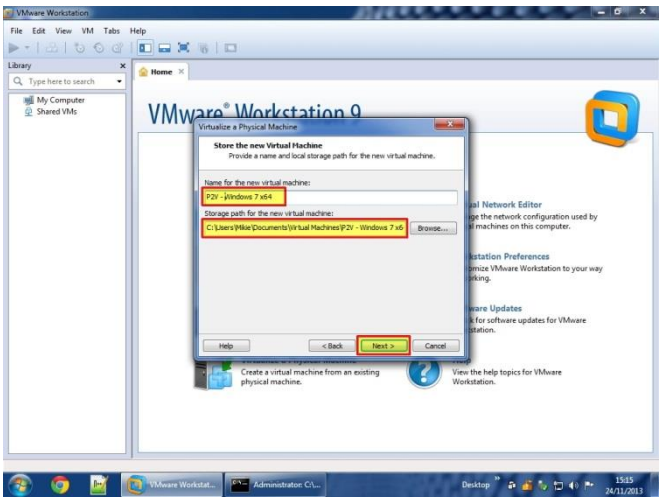
e. Within *cmd*, type ipconfig. Note the IP address of the computer



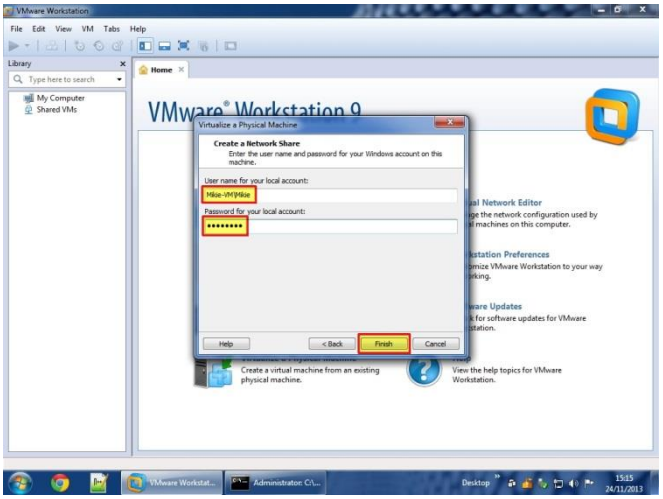
f. Enter the appropriate details of the physical machine that you want virtualised and click *Next* >



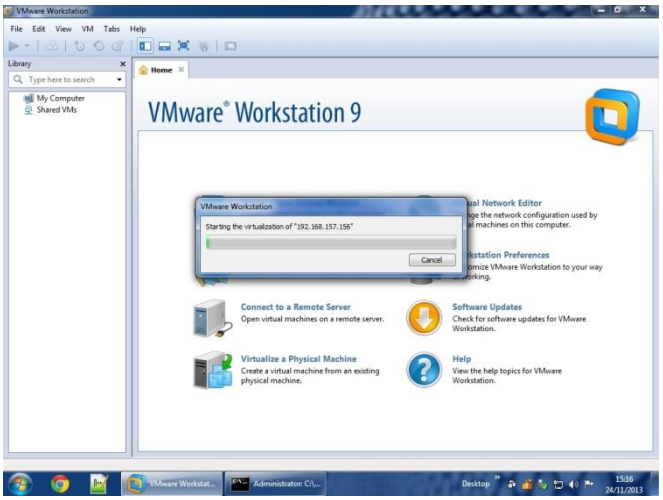
g. Enter an appropriate name for the VM and select the folder where you want its files stored in. Then click *Next* >



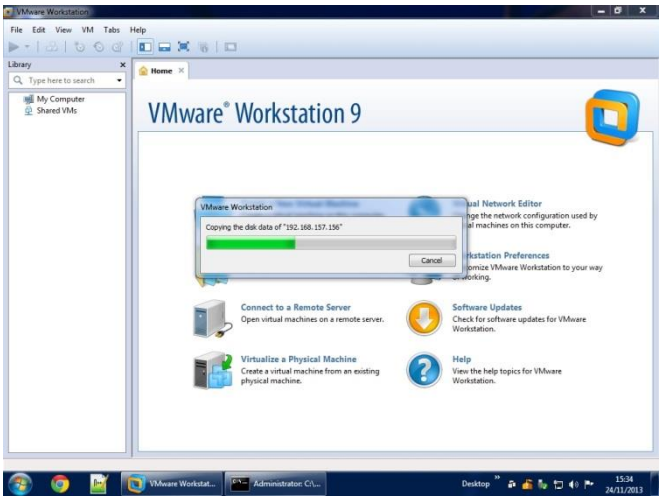
h. Enter the user name and password for the *Windows* account on the machine and click *Finish*



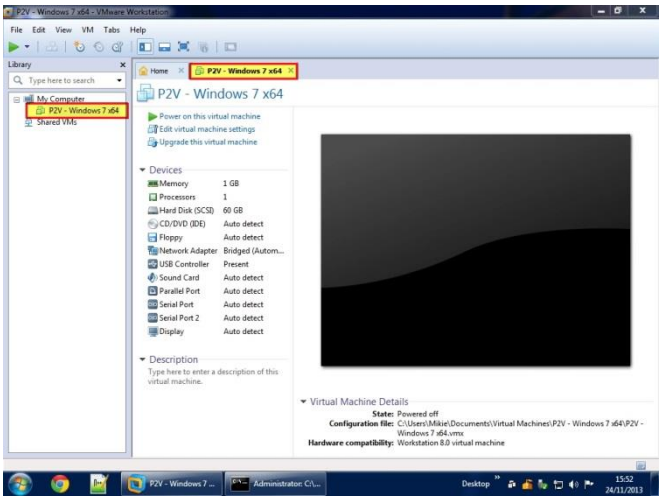
i. The virtualisation of the physical machine begins



j. The disk data of the physical machine is converted into virtual disk files



k. The virtualised machine now appears. This is a replica of the physical machine you selected. This now acts like any virtual machine and has all the typical files associated with same



Task A.8 - Installing Debian Linux

Task Overview

This task demonstrates how to install *Debian Linux*. *Debian Linux* is a free operating system and has many free applications available to it. '*Debian* is especially popular among advanced users because of its technical excellence and its deep commitment to the needs and expectations of the Linux community.'[35] The *Software Center* can be used to download and install applications for free of charge as you wish. It is very useful if you do not want to pay for an Operating System and applications and if you want easier access to more advanced features. However, there is a learning curve involved, as is the case with any new Operating System.

Please note that the following screenshots were taken from a previous assignment (COMP41140 - Computer Systems). The difference in screenshot style is as a result of this.

Technical Issues

The following hardware requirements are taken directly from the *Debian* website.[36]

Depending on your needs, you might manage with less than some of the recommended hardware listed in the table below. However, most users risk being frustrated if they ignore these suggestions.

A Pentium 4, 1GHz system is the minimum recommended for a desktop system.

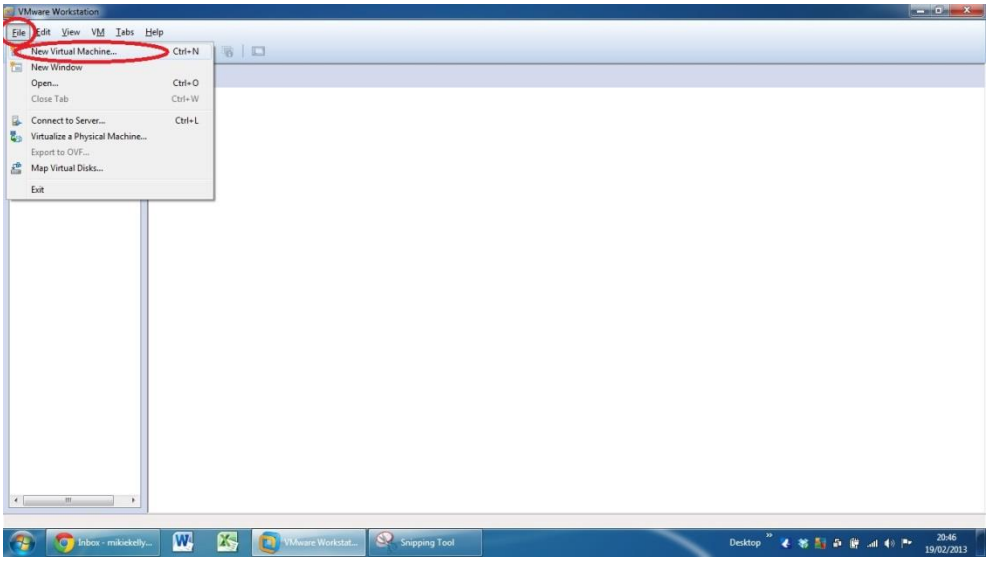
Table 3.2. Recommended Minimum System Requirements

Install Type	RAM (minimal)	RAM (recommended)	Hard Drive
No desktop	64 megabytes	256 megabytes	1 gigabyte
With Desktop	128 megabytes	512 megabytes	5 gigabytes

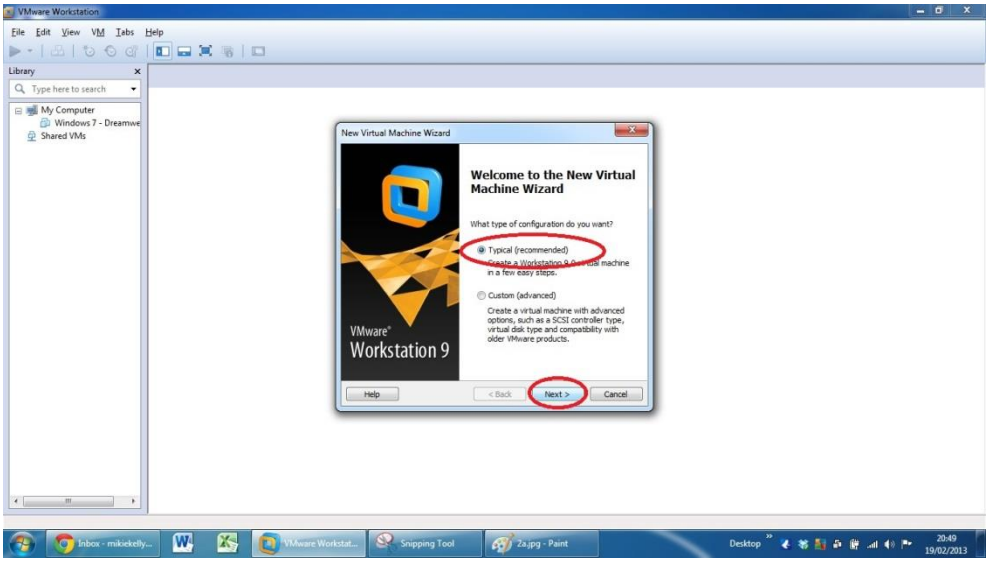
Task Guide

1. Create a New Virtual Machine

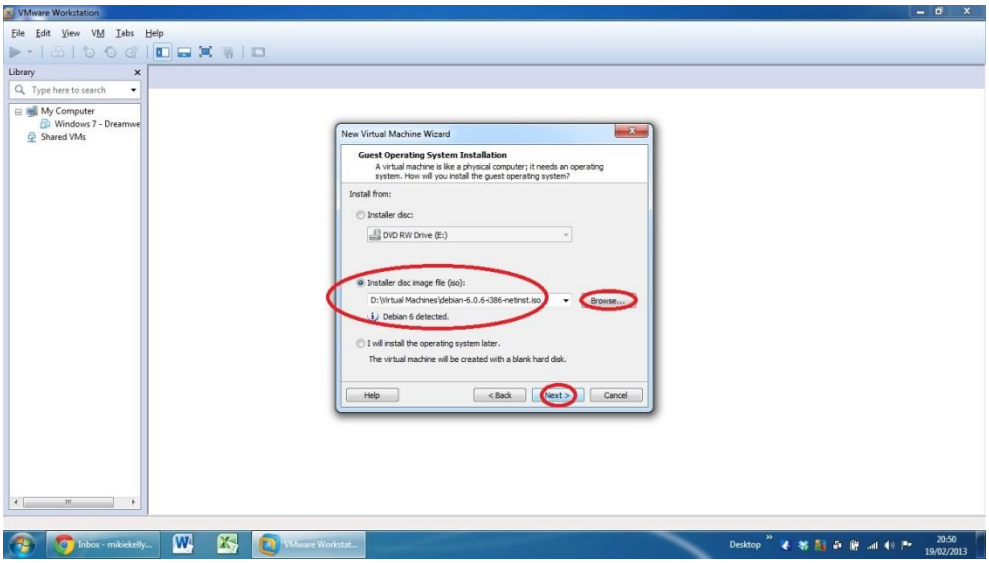
a. Within *VMware Workstation*, click *File* - *New Virtual Machine…*



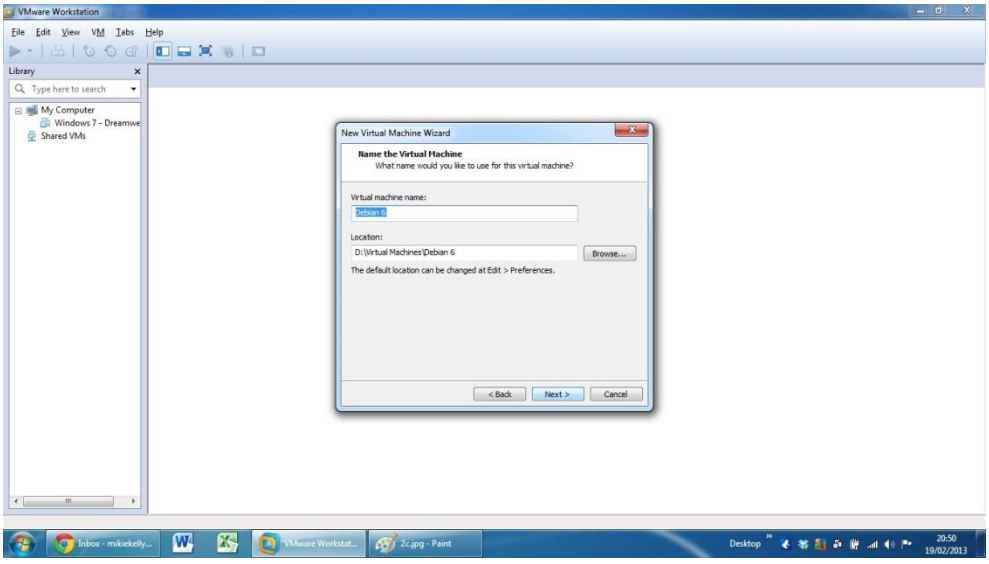
b. Select *Typical* and click *Next* >


VMware Workstation
File Edit View VM Tabs Help
Library
Type here to search
My Computer
Windows 7 - Dreamwe
Shared VMs
New Virtual Machine Wizard
Welcome to the New Virtual Machine Wizard
What type of configuration do you want?
Typical (recommended)
Custom (advanced)
Create a virtual machine with advanced options, such as a SCSI controller type, virtual disk type and compatibility with older VMware products.
VMware Workstation 9
Help
< Back
Next >
Cancel

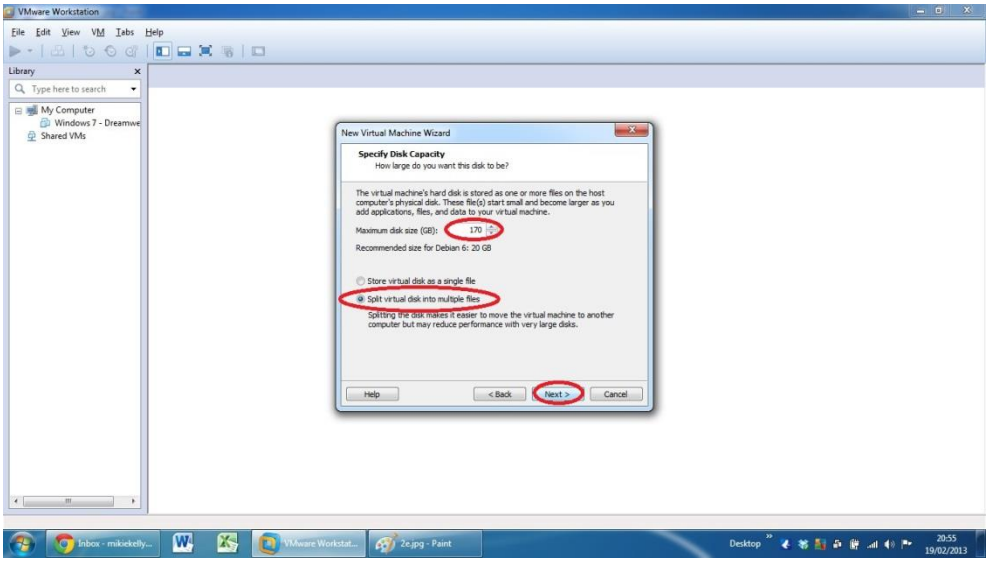
c. Browse to the location of the *Debian* ISO image file, select it and *click Next* >



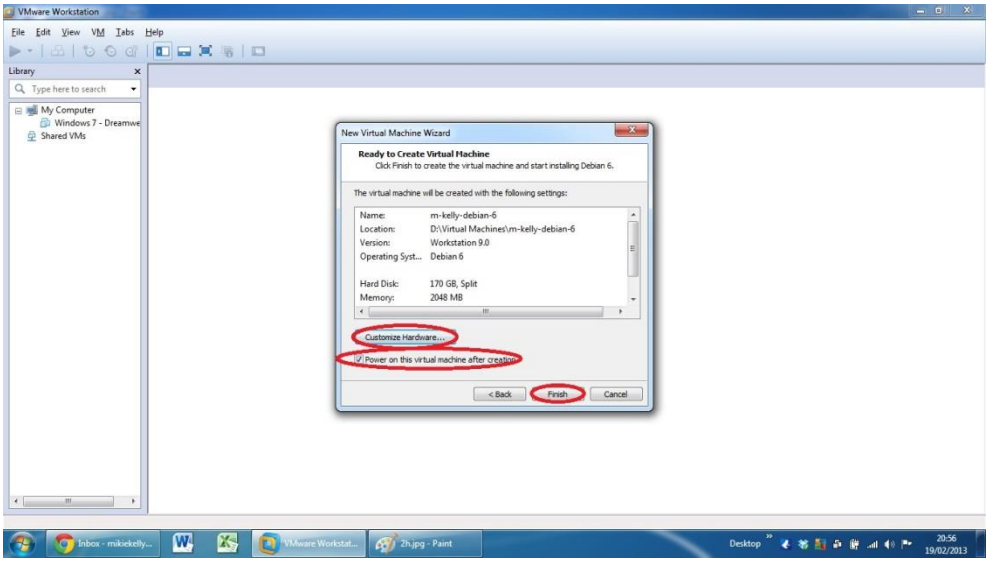
d. Name the Virtual Machine appropriately and select a folder where you want to save its files. It is good practice to keep the files of VMs in individual folders



e. Select the amount of space you want to assign to this VM, click *Split virtual disk into multiple files* and click *Next >*


VMware Workstation
File Edit View VM Tabs Help
Library
Type here to search
My Computer
Windows 7 - Dreamwe
Shared VMs
New Virtual Machine Wizard
Specify Disk Capacity
How large do you want this disk to be?
The virtual machine's hard disk is stored as one or more files on the host computer's physical disk. These file(s) start small and become larger as you add applications, files, and data to your virtual machine.
Maximum disk size (GB): 170
Recommended size for Debian 6: 20 GB
Store virtual disk as a single file
Split virtual disk into multiple files
Splitting the disk makes it easier to move the virtual machine to another computer but may reduce performance with very large disks.
Help
< Back
Next >
Cancel
Desktop
20:55
19/02/2013

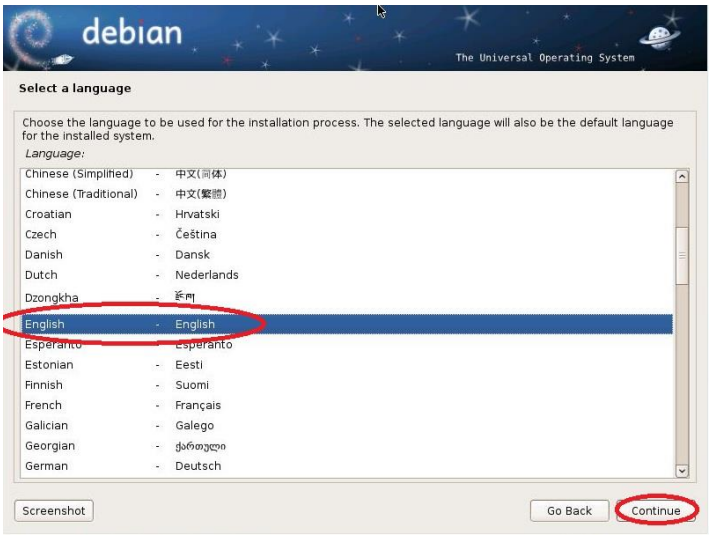
f. If you want to modify virtual hardware, click *Customize Hardware…* Then tick the box beside *Power on this virtual machines after creation*, and click *Finish*



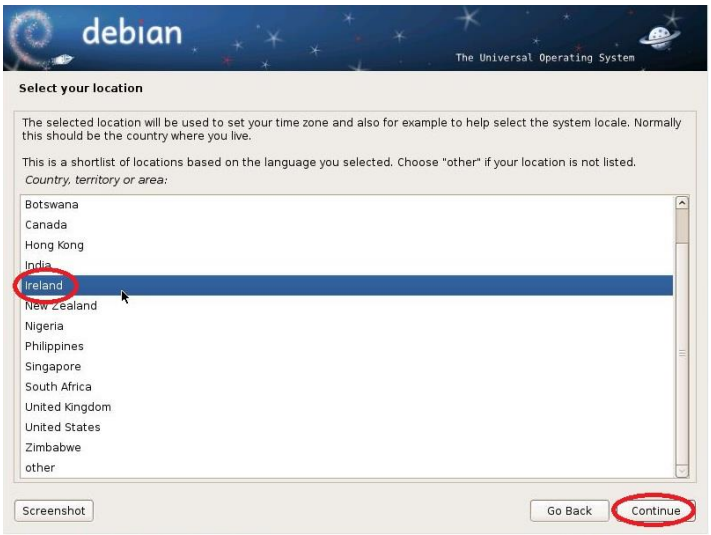
2. Install *Linux Debian*

a. Press *Enter* on *Graphical install*

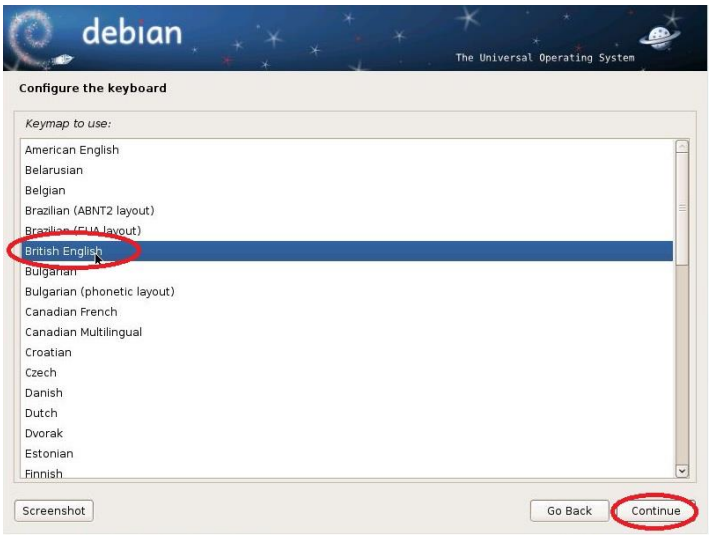
b. Select the appropriate language and press *Enter* on the keyboard



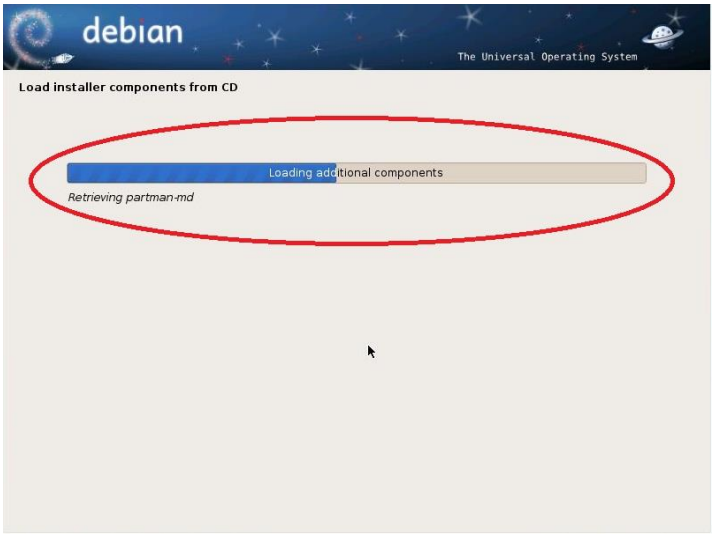
c. Select the appropriate location and click *Continue*



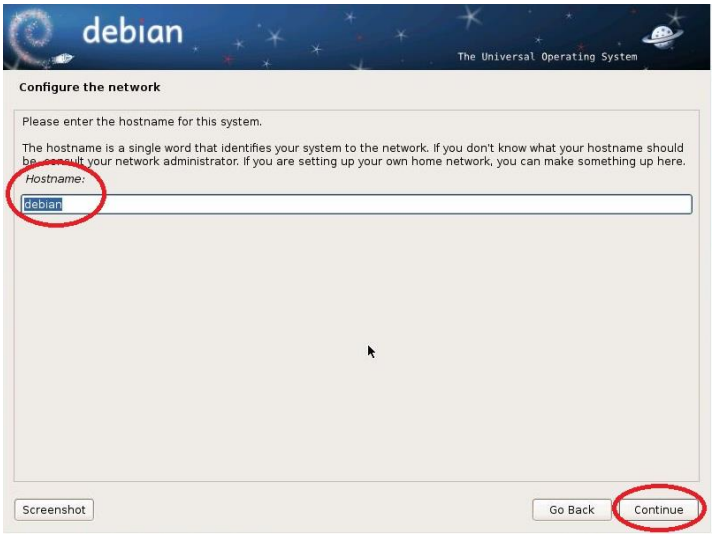
d. Select the appropriate keyboard configuration and click *Continue*



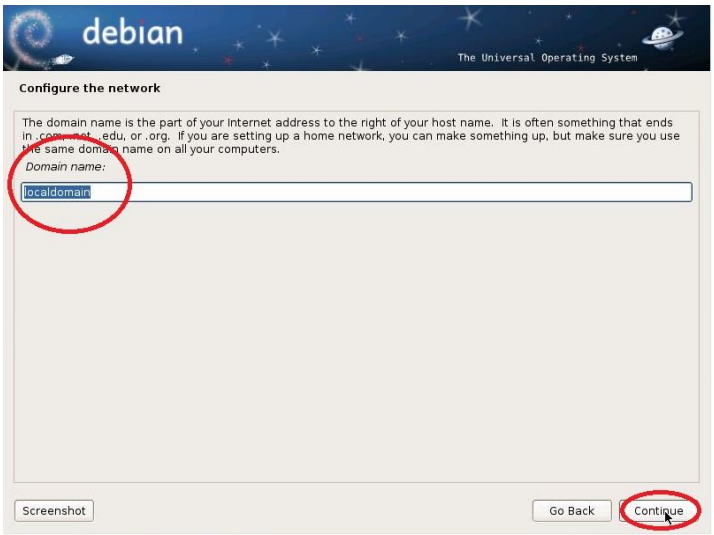
e. The software then loads the appropriate installer components based on your selections



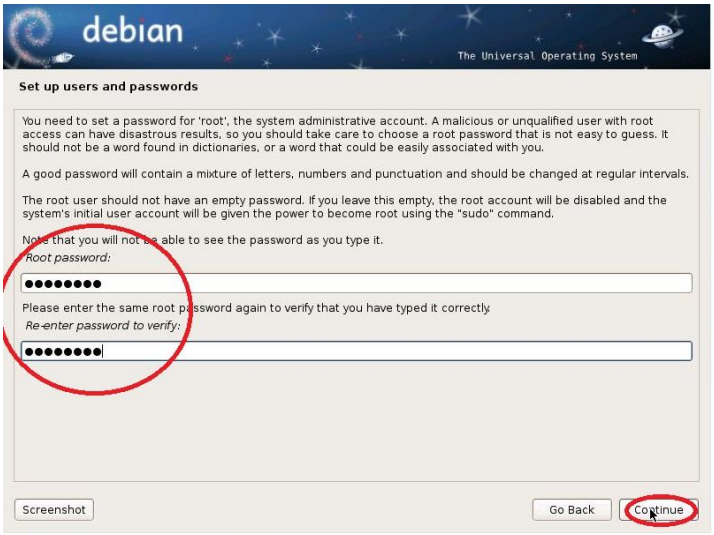
f. Type in the appropriate Hostname and click *Continue*


debian
The Universal Operating System
Configure the network
Please enter the hostname for this system.
The hostname is a single word that identifies your system to the network. If you don't know what your hostname should be, consult your network administrator. If you are setting up your own home network, you can make something up here.
Hostname:
debian
Screenshot
Go Back
Continue

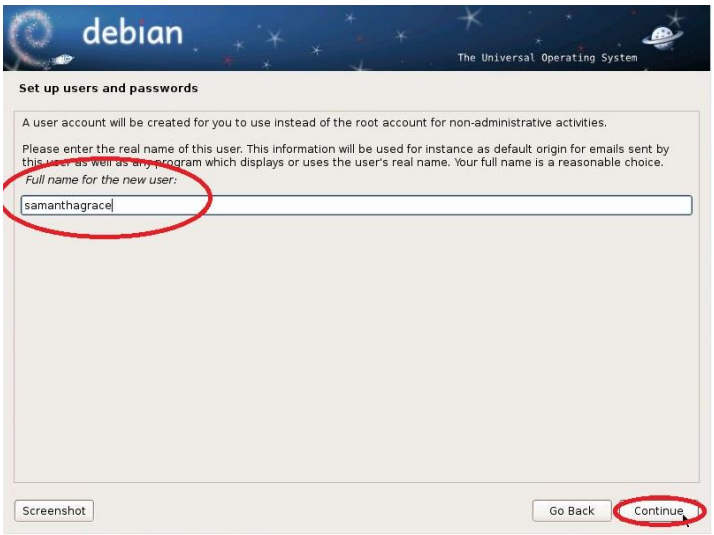
g. Type in an appropriate domain name and click *Continue*


debian
The Universal Operating System
Configure the network
The domain name is the part of your Internet address to the right of your host name. It is often something that ends in .com, .net, .edu, or .org. If you are setting up a home network, you can make something up, but make sure you use the same domain name on all your computers.
Domain name:
localdomain
Screenshot
Go Back
Continue

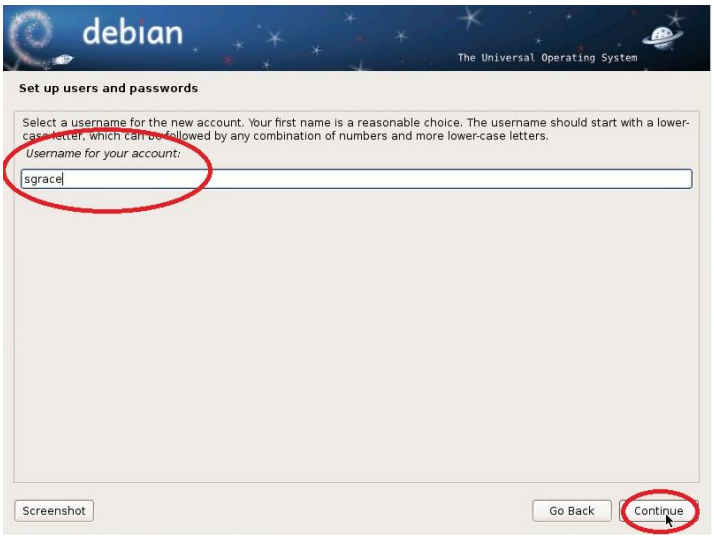
h. Type in the root account password that you will use for administrative purposes and click *Continue*


debian
The Universal Operating System
Set up users and passwords
You need to set a password for 'root', the system administrative account. A malicious or unqualified user with root access can have disastrous results, so you should take care to choose a root password that is not easy to guess. It should not be a word found in dictionaries, or a word that could be easily associated with you.
A good password will contain a mixture of letters, numbers and punctuation and should be changed at regular intervals.
The root user should not have an empty password. If you leave this empty, the root account will be disabled and the system's initial user account will be given the power to become root using the "sudo" command.
Note that you will not be able to see the password as you type it.
Root password:
Please enter the same root password again to verify that you have typed it correctly.
Re-enter password to verify:
Screenshot
Go Back
Continue

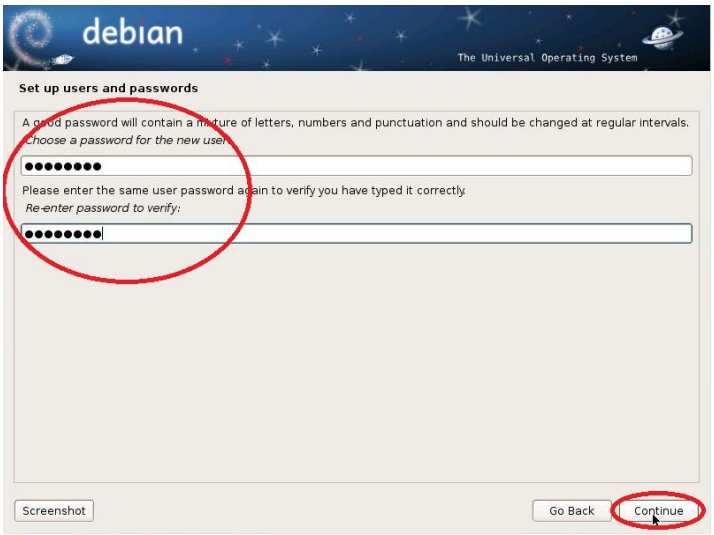
i. Type in the name for the first user that you want to create and click *Continue*


debian
The Universal Operating System
Set up users and passwords
A user account will be created for you to use instead of the root account for non-administrative activities.
Please enter the real name of this user. This information will be used for instance as default origin for emails sent by this user as well as any program which displays or uses the user's real name. Your full name is a reasonable choice.
Full name for the new user:
samanthagrace
Screenshot
Go Back
Continue

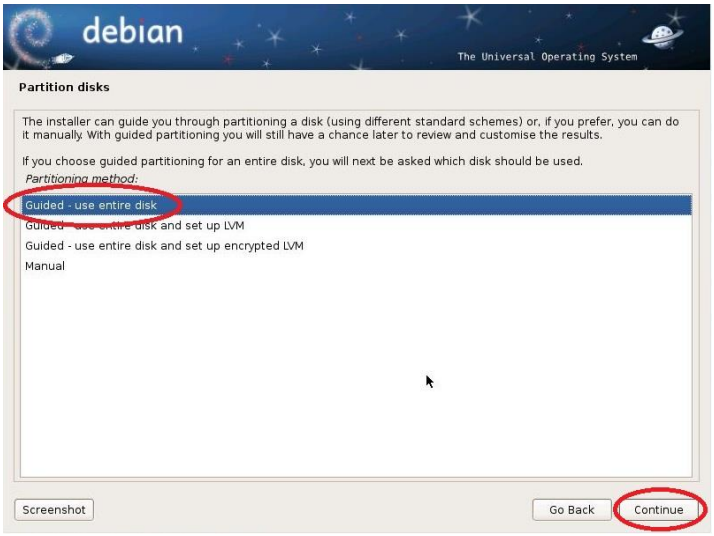
j. Type in the username for this account and click *Continue*


debian
The Universal Operating System
Set up users and passwords
Select a username for the new account. Your first name is a reasonable choice. The username should start with a lower-case letter, which can be followed by any combination of numbers and more lower-case letters.
Username for your account:
sgrace
Screenshot
Go Back
Continue

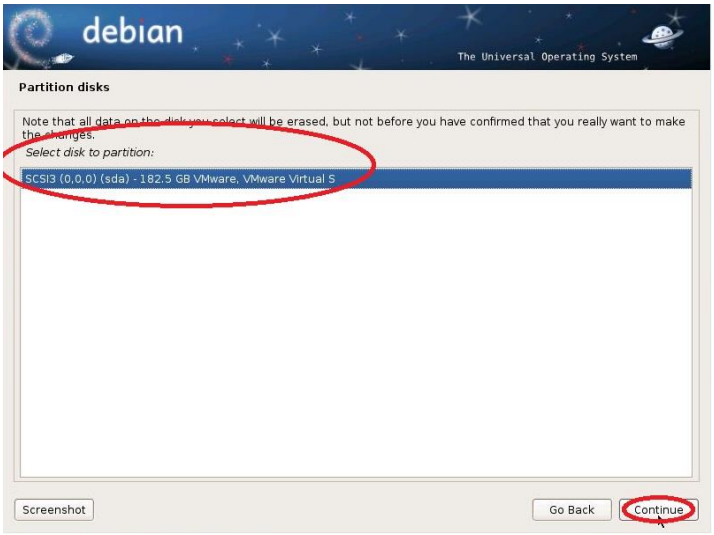
k. Type in the appropriate for the same account and click *Continue*


debian
The Universal Operating System
Set up users and passwords
A good password will contain a mixture of letters, numbers and punctuation and should be changed at regular intervals.
Choose a password for the new user:
Please enter the same user password again to verify you have typed it correctly.
Re-enter password to verify:
Screenshot
Go Back
Continue

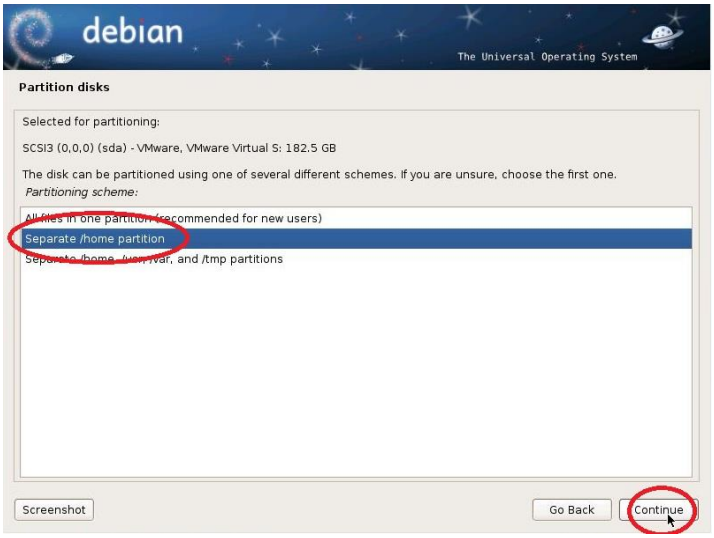
l. If you want to partition the Hard Disk Drive (HDD), it is done here. If not select *Guided - use entire disk* and click *Continue*


debian
The Universal Operating System
Partition disks
The installer can guide you through partitioning a disk (using different standard schemes) or, if you prefer, you can do it manually. With guided partitioning you will still have a chance later to review and customise the results.
If you choose guided partitioning for an entire disk, you will next be asked which disk should be used.
Partitioning method:
Guided - use entire disk
Guided - use entire disk and set up LVM
Guided - use entire disk and set up encrypted LVM
Manual
Screenshot
Go Back
Continue

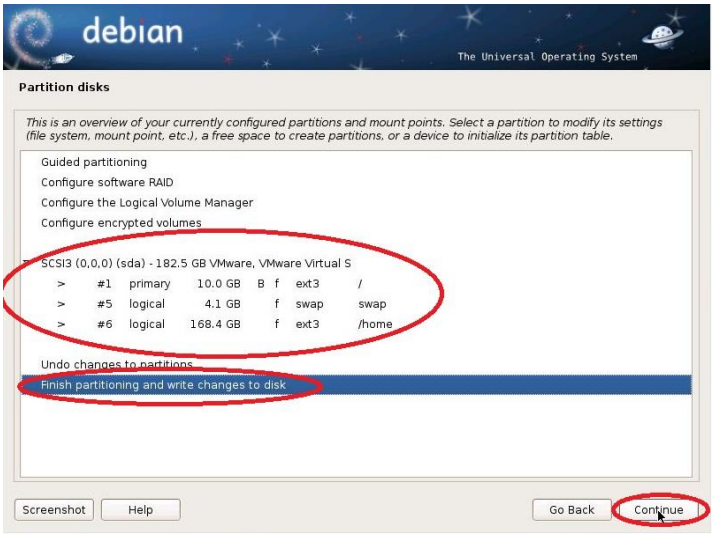
m. If partitioning, click on the appropriate disk that you want to partition and click *Continue*


debian
The Universal Operating System
Partition disks
Note that all data on the disk you select will be erased, but not before you have confirmed that you really want to make the changes.
Select disk to partition:
SCSI3 (0,0,0) (sda) - 182.5 GB VMware, VMware Virtual S
Screenshot
Go Back
Continue

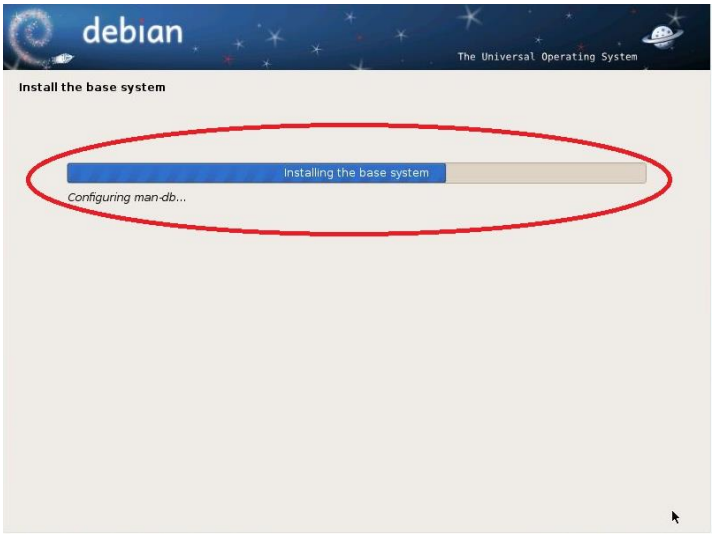
n. Partition as you wish and click *Continue*


debian
The Universal Operating System
Partition disks
Selected for partitioning:
SCSI3 (0,0,0) (sda) - VMware, VMware Virtual S: 182.5 GB
The disk can be partitioned using one of several different schemes. If you are unsure, choose the first one.
Partitioning scheme:
All files in one partition (recommended for new users)
Separate /home partition
Separate /home, /usr, /var, and /tmp partitions
Screenshot
Go Back
Continue

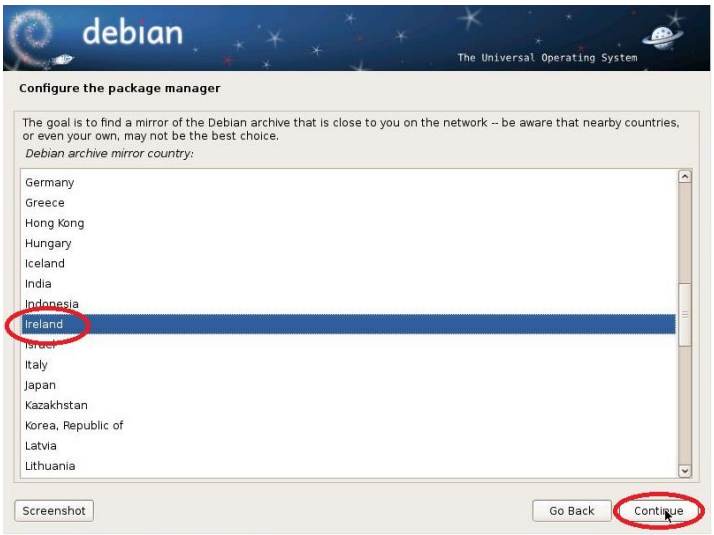
o. Confirm the partitioning that you have selected, select *Finish partitioning and write changes to disk*, and click *Continue*


debian
The Universal Operating System
Partition disks
This is an overview of your currently configured partitions and mount points. Select a partition to modify its settings (file system, mount point, etc.), a free space to create partitions, or a device to initialize its partition table.
Guided partitioning
Configure software RAID
Configure the Logical Volume Manager
Configure encrypted volumes
SCSI3 (0,0,0) (sda) - 182.5 GB VMware, VMware Virtual S
> #1 primary 10.0 GB B f ext3 /
> #5 logical 4.1 GB f swap swap
> #6 logical 168.4 GB f ext3 /home
Undo changes to partitions
Finish partitioning and write changes to disk
Screenshot
Help
Go Back
Continue

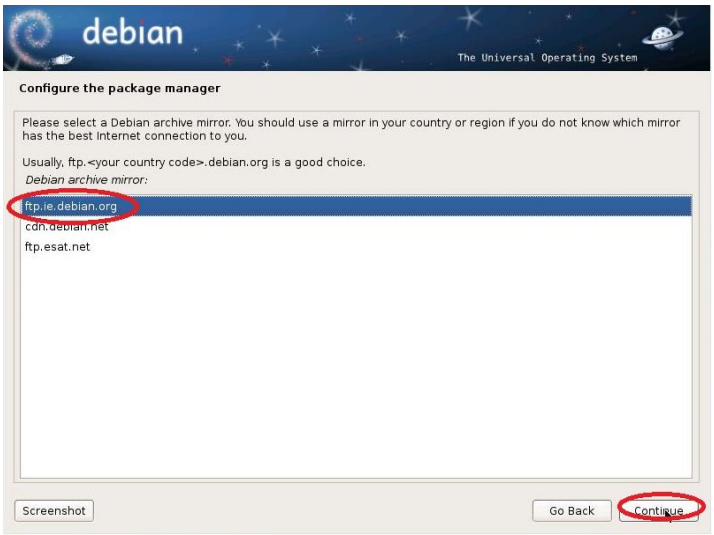
p. The base system is installed



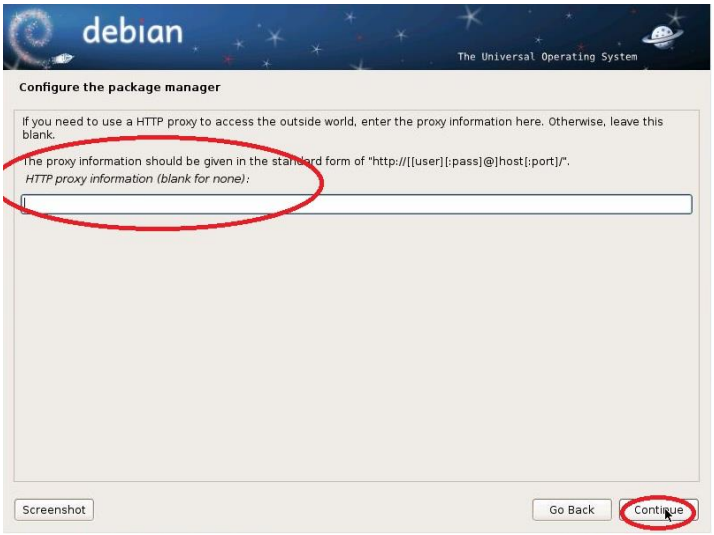
q. Select the appropriate archive mirror country and click *Continue*



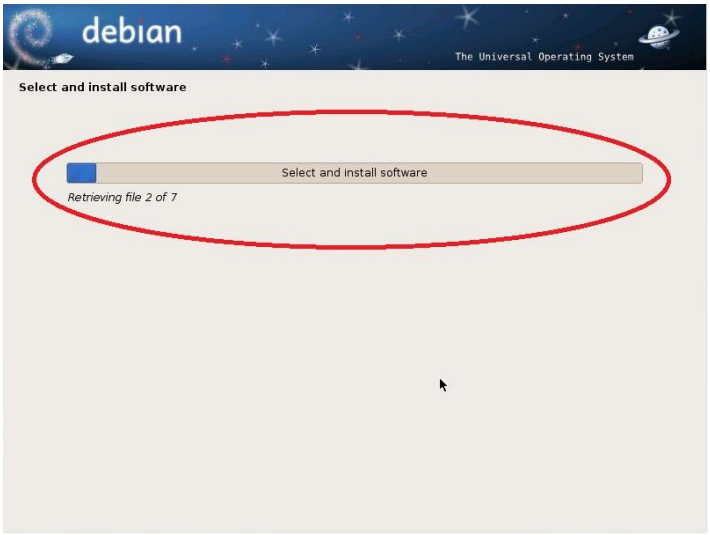
r. Select the appropriate archive mirror and click *Continue*


debian
The Universal Operating System
Configure the package manager
Please select a Debian archive mirror. You should use a mirror in your country or region if you do not know which mirror has the best Internet connection to you.
Usually, ftp.<your country code>.debian.org is a good choice.
Debian archive mirror:
ftp.ie.debian.org
cdn.debian.net
ftp.esat.net
Screenshot
Go Back
Continue

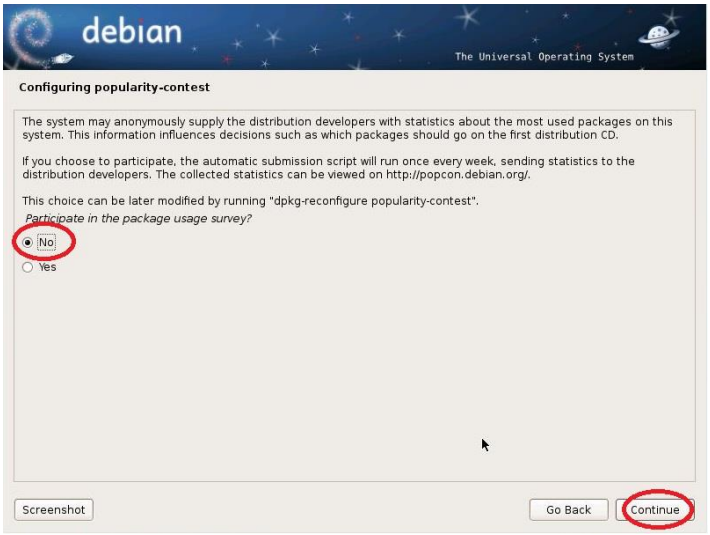
s. If you want to configure the *HTTP proxy information*, enter it here. Otherwise leave it blank and click *Continue*


debian
The Universal Operating System
Configure the package manager
If you need to use a HTTP proxy to access the outside world, enter the proxy information here. Otherwise, leave this blank.
The proxy information should be given in the standard form of "http://[[user][:pass]@]host[:port]/".
HTTP proxy information (blank for none):
Screenshot
Go Back
Continue

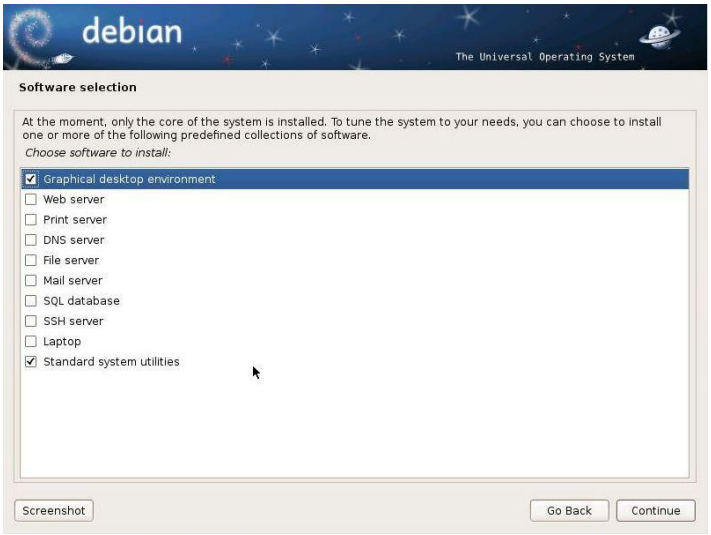
t. *Debian* continues its install



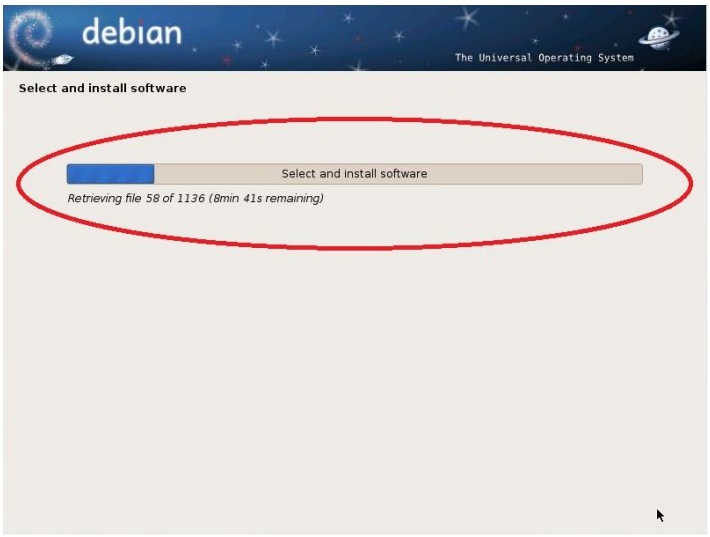
u. If you want to participate in the package usage survey, click *Yes*. Otherwise select *No* and click *Continue*


debian
The Universal Operating System
Configuring popularity-contest
The system may anonymously supply the distribution developers with statistics about the most used packages on this system. This information influences decisions such as which packages should go on the first distribution CD.
If you choose to participate, the automatic submission script will run once every week, sending statistics to the distribution developers. The collected statistics can be viewed on http://popcon.debian.org/.
This choice can be later modified by running "dpkg-reconfigure popularity-contest".
Participate in the package usage survey?
No
Yes
Screenshot
Go Back
Continue

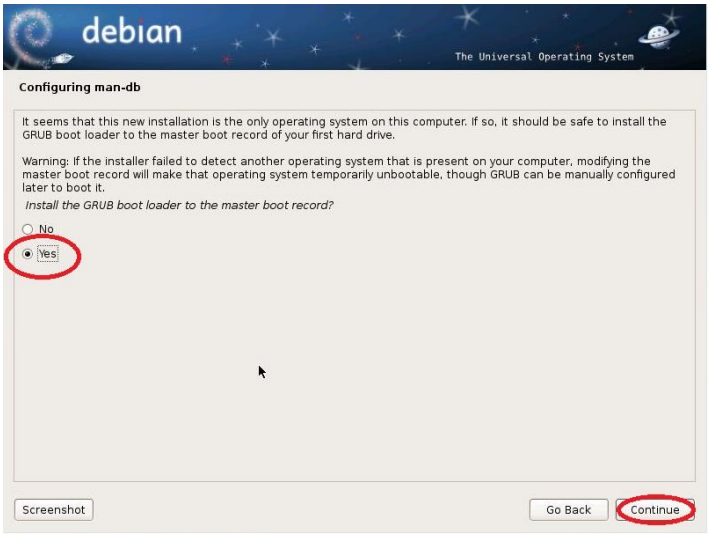
v. Select the software that you want to install and click *Continue*



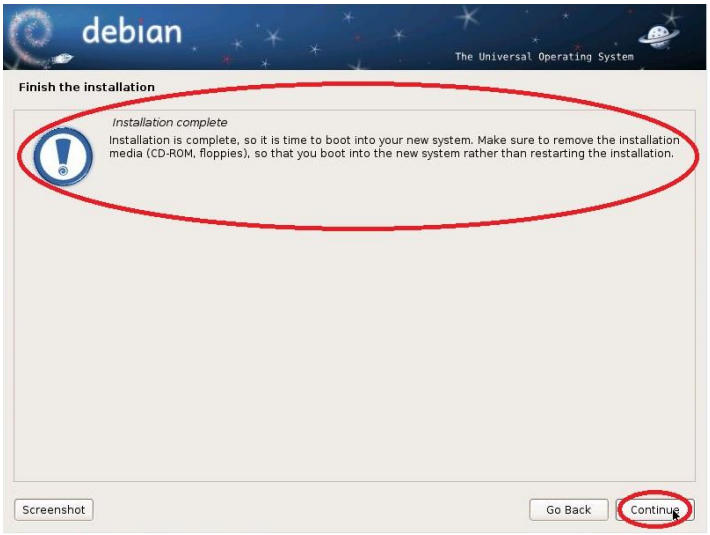
w. *Debian* continues to install this


debian
The Universal Operating System
Select and install software
Select and install software
Retrieving file 58 of 1136 (8min 41s remaining)

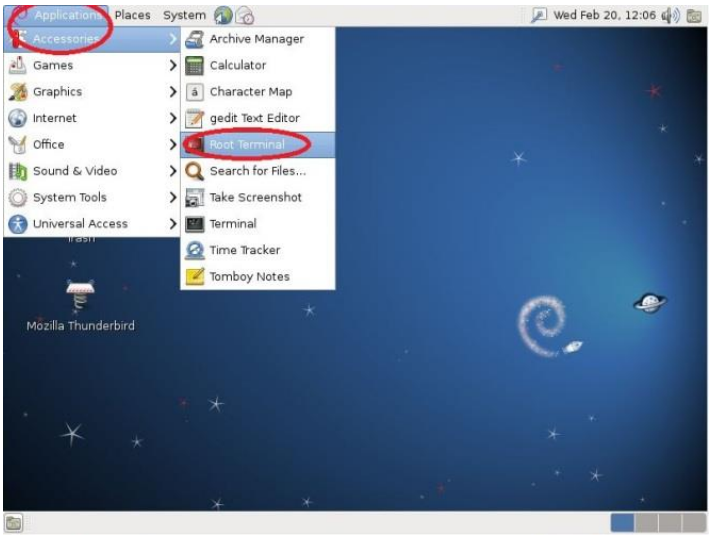
x. Select whether you want to install the GRUB boot loader to the master boot record or not and click *Continue*


debian
The Universal Operating System
Configuring man-db
It seems that this new installation is the only operating system on this computer. If so, it should be safe to install the GRUB boot loader to the master boot record of your first hard drive.
Warning: If the installer failed to detect another operating system that is present on your computer, modifying the master boot record will make that operating system temporarily unbootable, though GRUB can be manually configured later to boot it.
Install the GRUB boot loader to the master boot record?
No
Yes
Screenshot
Go Back
Continue

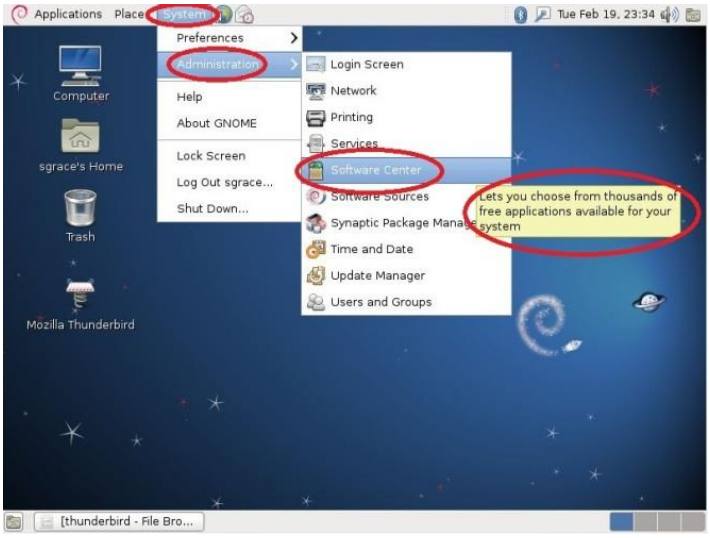
y. The installation is now complete. Click *Continue* to proceed to the *Debian* OS Home Page


debian
The Universal Operating System
Finish the installation
Installation complete
Installation is complete, so it is time to boot into your new system. Make sure to remove the installation media (CD-ROM, floppies), so that you boot into the new system rather than restarting the installation.
Screenshot
Go Back
Continue

z. You can then use *Root Terminal* for the majority of tasks if you know the commands



aa. You can then use the *Software Center* to download and install any applications you want



Endnotes

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